

Single E1/T1/J1 over Ethernet (IP)

IPM-1SE



The IPM-1SE is a 1U half 19" stand-alone or rack mountable pseudo wire (PW) device that transmits a real-time bit stream of TDM data (Time Division Multiplexing) over a packet switched network (IP network). Unlike other traffic types that can be carried over pseudo wires (e.g. ATM, frame relay, and Ethernet), TDM is a real-time bit stream, which traditionally carries voice-grade telephony channels. One critical issue in implementing TDM over IP is clock recovery. In native TDM networks the physical layer carries highly accurate timing information along with the TDM data, but when emulating TDM over Packet Switched Networks this synchronization is absent. The IPM-1SE is able to accurately regenerate the timing signals to the exacting standards and conformance with ITU-T. As core networks continue their conversion from traditional switched technology to IP based networks, the IPM-1SE provides a solution to continue using legacy TDM equipment, such as PABX, while the core migrates to IP based networks.

Features

- Supports synchronous TDM based and Ethernet service over IP network
- Devices can be cascaded to increase the number of interfaces
- Point to point application for E1/T1/J1 over IP
- Provides accurate E1/T1/J1 clock recovery
- Supports f/w upgrade
- Console terminal CLI, Telnet and MIB-2 SNMP support

Specifications

Ethernet

Data rate: 10/100Base-Tx, Half/full duplex
Connector: RJ45

Framing: framed/unframed traffic (ITU-T G.704)
Bit rate: 2.048Mbps
Line Code: HDB3
Line Impedance: 75 ohm(BNC) / 120 ohm(RJ-45)
Pulse amplitude: Nominal 2.37V $\pm 10\%$ for 75ohm, Nominal 3.00V $\pm 10\%$ for 120ohm
Zero amplitude: $\pm 0.1V$
Receive level: short haul -15dB, long haul -43dB
Connector: RJ45 for 120 ohms, BNC for 75 ohms

TDM interface

Framing: Unframed, D4, ESF, PCM30, PCM31
Bit rate: 1.544Mbps/ 2.048Mbps
Line Code: B8ZS / AMI/ HDB3
Line Impedance: 100/75/120 ohms
Pulse amplitude: Nominal 3.0 $\pm 20\%$,
Zero amplitude: $\pm 0.15V$
Receive level: short haul -15dB, long haul -43dB
Connector: RJ48C

Indications

Standards

System, TDM, Uplink, LAN
ITU-T G.703, G.704, G.706, G.732 and G.823
IEEE802.3, 802.3u

Power Input

AC: 100~240VAC DC: -18 ~72VDC

Power Consumption

15W

Dimensions

235 x 195 x 45mm (D x W x H)

Weight

1.6kg

Temperature

0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)

Humidity

10 ~ 90% non-condensing

Certification

CE, FCC, RoHS

MTBF

57,000 hrs



Ordering Information

Model Name

Description

IPM-1SE-AC

E1/T1 IP MUX with 100 ~ 240 VAC

IPM-1SE-DC+24

E1/T1 IP MUX with 24VDC

IPM-1SE-DC

E1/T1 IP MUX with 48VDC

IPM - 1SE - ☐☐

Example: IPM - 1SE - AC



E1/V.35 Over Ethernet Multi-Service Access Platform IPM-1SE / V35

IPM-1SE/V35 is designed as a multi-service access platform for PDH and V.35 over Ethernet applications. Structured/unstructured E1 and V.35 data can be mapped/de-mapped into/from Ethernet packets. An adaptive clock recovery method for Ingress PDH (PSN -> TDM) clock generation is implemented to support E1 (ITU-T G.824) Jitter performance.

Cost-effective LAN deployment (PDH and V.35 over ethernet)

IPM-1SE/V35 provides cost-effective applications of traditional circuit-switched system over Ethernet. With IPM-1SE/V35, it is easy to interconnect with existing phone systems and V.35 over Ethernet that are used to carry data, voice and video.

Transparent transmission

IPM-1SE/V35 can transparently transport proprietary signaling that are required to support PBX features, including call conference, call forwarding and SS7. Customer can easily apply and enjoy better integration of TDM, V.35 and Ethernet devices with lower network expense.

Bypass international toll

With a pair of IPM-1SE/V35 and guaranteed internet bandwidth, it is sure to save cost dramatically, and to ensure the QoS of voice based on interconnections of TDM telecommunications equipment.

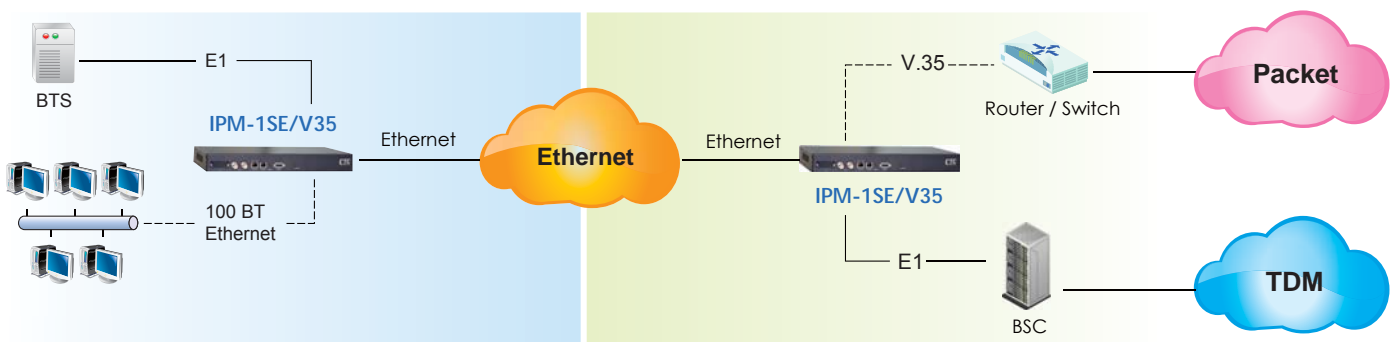
Features

- Support IETF RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- One E1 NRZ Serial Interface with LOS/AIS detection.
- One V.35 (Nx64K) interface.
- Use Raw Encapsulation method for PDH payload over Ethernet packet.
- Supports Circuit Emulation Service over Ethernet (CESoE) transport over Ethernet networks.
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA.
- Supports both Point-to-Point and Point-to-Multipoint operation.
- Supports Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant to ITU-T G.824 (E1 Jitter Control).
- Configurable jitter buffer depth to compensate up to 40ms of Packet Delay Variation.
- Lost packets processing/compensation via PW (Pseudo Wire) control field Sequence Number.
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth.
- PDH LOS detection triggered PW L field or payload AIS generation at Egress direction (TDM -> PSN).
- Configurable IEEE 802.3 DA/SA assignment.

Specifications

User interface (CPE side)	Port: One E1 (ITU-T G.703) and one V.35. Interface: RJ-48c (120 Ohm), BNC (75 Ohm) and M/34 female (V.35, DCE). E1 Line Coding: HDB3
Ethernet interface (CPE/CO side)	Port: two 100 Base-T Ethernet. One is for downlink and the other is for uplink. Interface: RJ-45
Dimensions	44 x 370 x 215mm (H x W x D)
Main power supply	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V (Option)
Environment condition	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature: 0°C~ 85°C Relative humidity: 5 ~ 95% non condensing
Configuration and management	RS-232 console port (Craft Terminal) or SNMP-based management

4 TDM over IP



Ordering Information

Model Name	Description
IPM-1SE/V35-AC	E1/V35 over Ethernet access unit with 100~240VAC

4 port E1 over Ethernet (IP)

IPM-4SE



IPM-4SE is designed as a multiservice access platform for PDH over IP applications. E1 frames can be mapped/de-mapped into/from IP packets. An adaptive clock recovery method for Ingress PDH (PSN ->TDM) clock generation is implemented to support E1 (ITU-T G.823) Jitter performance.

IPM-4SE provides cost-effective applications of traditional circuit switched system over IP. With IPM-4SE, it is easy to interconnect existing phone systems over IP that are used to carry data, voice and video. With high precision clock recovery technology, IPM-4SE is capable of supporting 2G/3G backhaul and provides smooth services. IPM-4SE can transparently transport proprietary signaling that is required to support PBX features, including call conference, call forwarding and SS7.

Features

- Support IETF RFC4533 Structure-Agnostic TDM over Packet (SAToP), Metro Ethernet Forum MEF8.
- 4 x E1 NRZ Serial Interface with LOS/AIS detection
- Use Raw Encapsulation method for PDH payload over IP packet.
- Support Circuit Emulation Service over IP.
- Comply with IETF draft standard for CESoPSN and SAToP; Metro Ethernet Forum MEF8 IA.
- Support both Point-to-Point and Point-to-Multipoint operation.
- Support 4 independent Adaptive Clock recovery block for Ingress PDH (PSN -> TDM) clock generation. Recovered clock jitter is compliant with ITU-T G.824 (E1 Jitter Control).
- Independent configurable jitter buffer depth to compensate up to 250ms of Packet Delay Variation.
- Support framed/unframed traffic (ITU-T G.704)
- Lost packets processing/compensation via PW (Pseudo Wire) control field Sequence Number.
- Provide Subscriber side Data traffic bandwidth control to guarantee enough TDM payload bandwidth.
- PDH LOS detection triggered PWL field or payload AIS generation at Egress direction (TDM -> PSN).
- Configurable IEEE 802.3 DA/SA assignment.
- Configuration can be made through RS-232 console port.

Specifications

User interface	Port: up to 4 x E1 (ITU-T G.703) Interface: RJ-48c (120 Ohm) Line Coding: HDB3
Ethernet interface	Port: 100 Base-T Ethernet Interface: RJ-45
Dimensions	44 x 370 x 215mm (H x W x D)
Main power supply	AC: 110 ~ 240V @ 47 ~ 65Hz DC: -72V ~ -36V (Option)
Environment condition	Ambient temperature: 0°C ~ 50°C (0°C ~ 65°C, optional) Storage temperature : 0°C~ 85°C Relative humidity: 5 ~ 95% non condensing
Configuration and management	RS-232 console port, CLI or SNMP-based management



Ordering Information

Model Name Description

IPM-4SE-AD (CO)	4 E1 over Ethernet CO modem with AC+DC power
IPM-4SE-AD (CPE)	4 E1 over Ethernet CPE modem with AC+DC power

IPM - 4SE - ()

Example: IPM - 4SE - AD(CO)



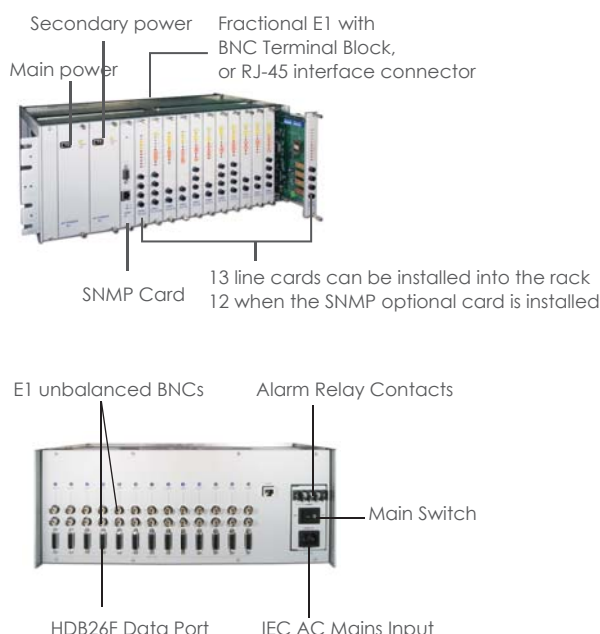
4U 13-Slot Managed E1 Concentrator ERM01

The ERM01 is a 4U 19(23)" concentrator rack type E1 DSU/CSU for Fractional and Unframed G.703 E1 Access for central office installations. There are 13 slots available for hot swappable G.703 E1 cards. An optional SNMP card can be installed into the last slot for configuration and management, leaving 12 slots available for G.703 cards. The SNMP card provides both local control via an RS-232 serial console port and remote IP management using Telnet or industry standard SNMP protocol. Each E1 card may be linked to a remote E1/FE1 stand-alone Access Unit for various LAN, Data, or hosts over E1 network services. The ERM01 accommodates an optional second hot swappable shared power supply module which may derive power from AC (90-250) or DC (-48V) power sources. On the rear panel, combinations of BNC, RJ-45 and wire-wrap terminals are utilized for E1 Line interface connections. Adapter cables are used to convert the HDB26F DCE data ports to V.35, RS-530, RS-449, X.21 or 10/100 Base Ethernet depending on the installed card.

Features

- Managed chassis (Optional) with DSU/CSU blades
- Supports Fractional and Unframed E1 with EOC control
- Hot swappable blades and power modules
- Interface Cards for V.35, X.21, RS-530, RS-449, RS-232, Ethernet Bridge and Router
- I/O connectors all on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Supports local serial Console, remote Telnet and SNMP
- Supported by SmartView EMS

ERM01 overview



Specifications

G.703 E1

Frame format	Unframed/ Framed, CCS(PCM31)/ CAS(PCM30)/ CRC4 on/off
Bit rate	2.048Mbps±50 ppm
Line Code	AMI/ HDB3
Receiving level	0 ~ -43dB
Line Impedance	75 ohm(BNC) / 120 ohm (RJ-45)
Jitter Performance	According to ITU-T G.823
Pulse amplitude	Nominal 2.37V ±10% for 75ohm, Nominal 3.00V ±10% for 120ohm Zero amplitude ± 0.1V
Connector	BNC for unbalanced and RJ-45 for balanced

Transmit frequency tracking	Internal timing ±30 ppm Loopback timing ±50 ppm External timing ±100 ppm
Return loss	12dB for 51 ~ 102KHz 18dB for 102 ~ 2048KHz 14dB for 2048~ 3072KHz

User Data Channel

Interface Types	RS-530/RS-449/RS-232,X.21/V.35, 10/100Base-T Ethernet Bridge & Router
Connector	High density DB26 Female
Line code	NRZ (except bridge)
Data Rate	N x 56Kbps or N x 64Kbps, Where N equal 1 to 32
Time slot allocation	User defined
Control signals	CTS constantly On, DSR constantly ON, except during test loops, DCD constantly ON or follows RTS, except during signal loss
Loopback	Line loopback, Payload loopback, Local loopback, DTE loopback
Clock modes	Clock mode 0 Rx & Tx clocks (recovered) to (DCE1) sync DTE Clock mode 1 Rx & Tx clocks (internal oscillator) to(DCE2) sync DTE Clock mode 2 Rx clock to sync device,(DTE1) Tx clock from sync device Clock mode 3 Rx & Tx clocks from (DTE2) sync DCE (from ETC and ERC pin) Clock mode 4 Rx & Tx clocks from sync DCE (DTE3) (all from ETC pin)
Standards	ITU-T G.703, G.704, G.706 and G.732 and ETSI ETS 300 420
Power Input	AC: 100~240VAC, DC: -42~-55
Power Consumption	80W
Dimensions	Chassis : 285 x 438 x 180mm (D x W x H) Line card: 260 x 22 x 180mm (D x W x H)
Weight	6.6kg
Temperature	0°C ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

E1 CSU/ DSU Slide-in Card



Network Management Card

- ERM01-SNMP



Ethernet Bridge Card

Unframed/ Framed E1 to 10/100Base-TX

- ERM01-FE1/ET100
- ERM01-E1U/ET100



E1 to Data Card

Unframed/ Framed E1 to Data Card

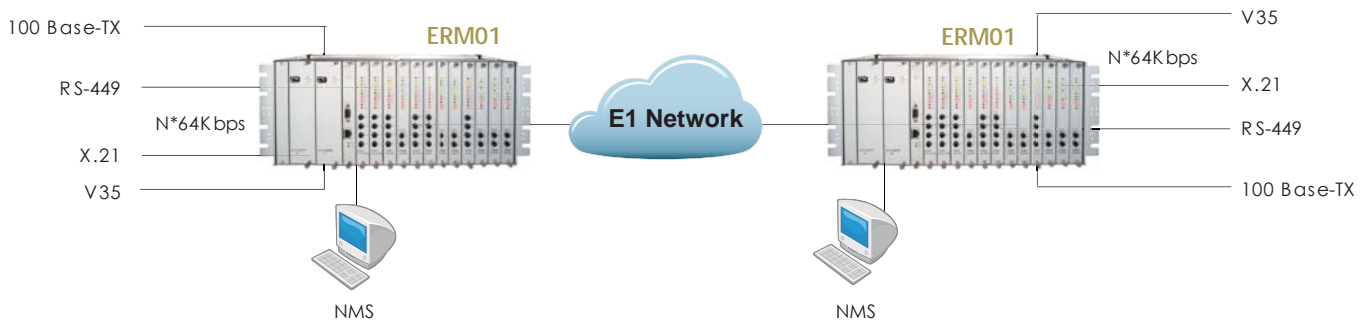
- ERM01-FE1/V.35
- ERM01-FE1/RS-530
- ERM01-FE1/RS-449
- ERM01-FE1/X.21
- ERM01-FE1/RS-422
- ERM01-E1U/V.35
- ERM01-E1U/RS-530
- ERM01-E1U/RS-449
- ERM01-E1U/X.21
- ERM01-E1U/RS-422



Ethernet Router Card

Unframed/ Framed E1 to 10/100Base-TX

- ERM01-FE1/ET100R
- ERM01-E1U/ET100R



Ordering Information

Model Name	Type	Description
ERM01-BR/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ BNC, RJ-45 on rear panel
ERM01-BR/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ BNC, RJ-45 on rear panel
ERM01R/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ RJ-45 on rear panel
ERM01R/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ RJ-45 on rear panel
ERM01B/AC-CH	Chassis	4U 19" 13-Slot chassis AC power type w/ BNC on rear panel
ERM01B/DC-CH	Chassis	4U 19" 13-Slot chassis DC power type w/ BNC on rear panel
ERM01/AC	Power	AC Power plug-in module (90 to 250 VAC)
ERM01/DC	Power	-48 VDC Power plug-in module (±36 to ±76 VDC)
ERM01-SNMP	SNMP	SNMP card with both interfaces: RS-232 and 10/100Base-TX
ERM01-FE1/ET100	Card	Fractional E1 to 10/100Base-T/Tx Ethernet Bridge
ERM01-FE1/ET100R	Card	Fractional E1 to 10/100Base-T/Tx Ethernet Router
ERM01-FE1/V35	Card	Fractional E1 to V.35 card
ERM01-FE1/RS530	Card	Fractional E1 to Serial: RS-530 (cable selected)
ERM01-FE1/RS449	Card	Fractional E1 to Serial: RS-449 (cable selected)
ERM01-FE1/X21	Card	Fractional E1 to Serial: X.21 (cable selected)
ERM01-FE1/RS422	Card	Fractional E1 to Serial: RS-422 (cable selected)
ERM01-E1-U/ET100	Card	Unframed E1 <--> 10/100Base-T/Tx Ethernet Bridge
ERM01-E1-U/ET100R	Card	Unframed E1 <--> 10/100Base-T/Tx Ethernet Router
ERM01-E1-U/V35	Card	Unframed E1 <--> V.35 card
ERM01-E1-U/RS530	Card	Unframed E1 to RS-530 (cable selected)
ERM01-E1-U/RS449	Card	Unframed E1 to RS-449 (cable selected)
ERM01-E1-U/X21	Card	Unframed E1 to X.21 (cable selected)

ERM01 - □□ / □□ - □□

Example: ERM01 - BR/AC - CH

Network Management Card

ERM01-SNMP



This single slot card is installed in the last slot of the chassis, just before the power modules. The card has an RS-232 serial port on a DB9 female connector for connection of any standard dumb terminal for an easy menu driven configuration. The RJ-45 jack is a 10/100 Ethernet connector for IP based management. The SNMP card supports remote Telnet management with the same user friendly menu interface as local console. SNMP can be used by compiling the enterprise MIB into your favorite network management software.

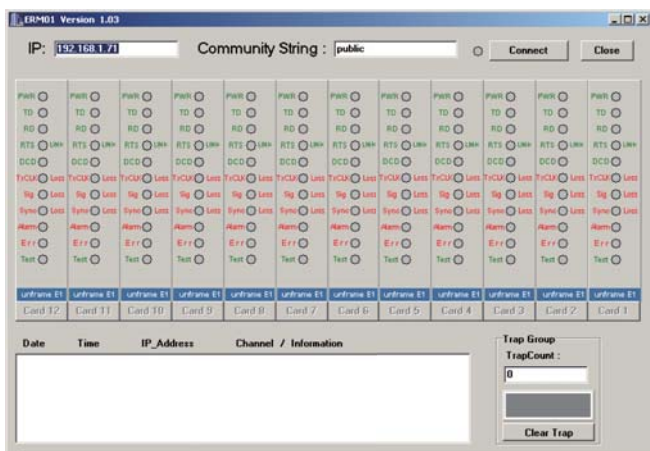
Features

- RS-232 port for dumb terminal at 38.4k 8bit no parity
- Ethernet port for 10/100Base-TX compliant with IEEE802.3u
- SNMP V1 and V2C support
- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable

Specifications

Electrical Interface	Console RS-232 port LAN 10/100Base-TX
Network Management	<ul style="list-style-type: none"> • Network management: provide all system software updates, and management system interaction through Ethernet port. • Out-band management: supports Telnet and SNMP , EMS • Configuration Management • Performance Management • Fault Management • Status Monitoring
Indications	PWR, Link, SNMP
Dimensions	260 x 22 x 180mm (D x W x H)
Weight	0.25kg
Temperature	0°C ~ 50°C (Operating) -10°C ~ 60°C (Storage)
Humidity	10 ~ 90% non-condensing
Certifications	CE, FCC, LVD, RoHS
MTBF	65,000 hrs

GUI Management



Serial Console Management

```
*****
***** CTC UNION TECHNOLOGIES CO., LTD *****
***** ERM-01 NMS Terminal Mode V4.01 *****
*****

Main Menu and Rack Status:
1:Slot #1 >> FE1 << || 7:Slot #7 >> FE1 <<
2:Slot #2 >> FE1 << || 8:Slot #8 >> FE1 <<
3:Slot #3 >> FE1 << || 9:Slot #9 >> FE1 <<
4:Slot #4 >> FE1 << || A:Slot #10 >> FE1 <<
5:Slot #5 >> FE1 << || B:Slot #11 >> FE1 <<
6:Slot #6 >> FE1 << || C:Slot #12 >> FE1 <<

Command Function Key:
'l' to '9', 'A' to 'C': I/O Cards Setting
'R': Refresh Status
'ESC': Logout
'S': System Configuration and TFTP Setup
'M': Manager Configuration Setup
```

Fractional E1 to 10/100Base-TX Ethernet Router Card

ERM01-FE1/ET100R



The ERM01-FE1/ET100R Router Card is a single slot card that can be installed in any available slot to provide IP over E1 transmission. The router engine uses an embedded system which can be configured and controlled from a serial port, Telnet or Web based user interface. It supports industry standard encapsulations of PPP and HDLC as well as proprietary header for Cisco router's HDLC.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client ; NAT Function
- Virtual Server Mapping ; SNMP MIB-2 supported
- Supports VPN pass through ; Forwarding IP multicast support
- DNS proxy server ; SNTP supported
- Simple Statistical ; Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco HDLC WAN protocol encapsulation
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
Connection	1 x Ethernet LAN port (10/100)
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps
Function	Proxy Routing, IP Routing, Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

Fractional E1 to 10/100Base-TX Ethernet Bridge Card

ERM01-FE1/ET100



The ERM01-FE1/ET100 Bridge Card is a single slot card that can be installed in any available slot to provide Ethernet over E1 transmission. The bridge engine uses an ASIC design for wire speed performance and supports industry standard HDLC encapsulation. The ERM01-E1U-ET100 bridge is an economical solution for LAN to LAN applications over framed or Unframed E1 transport.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size: 64~1522 Bytes Buffer : 340 frames Delay : 1 frame
LAN	Standard : compliant to IEEE802.3 /803.2u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: Nx64 (where N=1 to 31) for Fractional E1 2048Kbps for Unframed E1



Fractional E1 to Data Card ERM01-FE1/Data

The high-speed data cards are available in two E1 types; one for fractional E1 and one for Unframed E1 (transparent) and with data communication interfaces for V.35, RS-530, X.21 and RS-449(V.36). All line cards come with adapter cables that terminate in the appropriate user interface for DCE. Simple DIP Switch settings provide all the control for E1 and Dataport settings. When the ERM01 is equipped with optional SNMP, centralized management can configure and monitor the card and performance without manual DIP setting.

Features

- HS (up to 2Mb/s) Serial interface card for serial transport over G.703 E1.
- DIP switch or SNMP managed (Optional)
- Hot swappable without effecting any other line card
- Front panel pushbuttons to activate loop testing with integral 511 pattern BERT.
- LED status indicators for E1 Signal, Sync and Dataport TD, RD, and CD.

Cable Adapter :

HDB26M to MB34F for V.35
HDB26M to DB25F for RS-530
HDB26M to DB37F for RS-449(V.36)
HDB26M to DB15F for X.21

Specifications

- Compliant with ITU-T standards for V.35, RS-530, X.21 and V.36
- Synchronous transmission at Nx64 data rate (2.048M for Unframed)
- Line code: NRZ
- Control Signals: CTS always ON



Unframed E1 to 10/100Base-TX Ethernet Router Card ERM01-E1U/ET100R

The ERM01-E1U/ET100R Router Card is a single slot card that can be installed in any available slot to provide IP over E1 transmission. The router engine uses an embedded system which can be configured and controlled from a serial port, Telnet or Web based user interface. It supports industry standard encapsulations of PPP and HDLC as well as proprietary header for Cisco router's HDLC.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client
- NAT Function
- Virtual Server Mapping
- SNMP MIB-2 supported
- Supports VPN pass through
- Forwarding IP multicast support
- DNS proxy server
- SNTP supported
- Simple Statistical
- Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco HDLC WAN protocol encapsulation
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
Connection	1 x Ethernet LAN port (10/100)
WAN Speed	Synchronous Port 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps
Function	Proxy Routing, IP Routing, Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

Unframed E1 to 10/100Base-TX Ethernet Bridge Card

ERM01-E1U/ET100



The ERM01-E1U/ET100 Bridge Card is a single slot card that can be installed in any available slot to provide Ethernet over E1 transmission. The bridge engine uses an ASIC design for wire speed performance and supports industry standard HDLC encapsulation. The ERM01-E1U-ET100 bridge is an economical solution for LAN to LAN applications over an Unframed E1 transport.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge

LAN Table: 256 MAC address with 5 minute automatic aging

Filtering and Forwarding : wire speed

Packet size: 64~1522 Bytes

Buffer : 340 frames

Delay : 1 frame

LAN

Standard : compliant to IEEE802.3 /803.2u

Data rate : 10Base-T / 100Base-TX, Full or Half Duplex

Connector : RJ45

General

IP bridging over G.703 E1

ISO standard HDLC encapsulation

WAN Speed: Nx64 (where N=1 to 31) for Fractional E1
2048Kbps for Unframed E1

Unframed E1 to Data Card

ERM01-E1U/Data



The high-speed data cards are available in two E1 types; one for fractional E1 and one for Unframed E1 (transparent) and with data communication interfaces for V.35, RS-530, X.21 and RS-449(V.36). All line cards come with adapter cables that terminate in the appropriate user interface for DCE. Simple DIP Switch settings provide all the control for E1 and Dataport settings. When the ERM01 is equipped with optional SNMP, centralized management can configure and monitor the card and performance without manual DIP setting.

Features

- HS (2Mb/s) Serial interface card for serial transport over G.703 E1.
- DIP switch or SNMP managed (Optional)
- Hot swappable without effecting any other line card
- Front panel pushbuttons to activate loop testing with integral 511 pattern BERT.
- LED status indicators for E1 Signal, Sync and Dataport TD, RD, and CD.

Specifications

- Compliant with ITU-T standards for V.35, RS-530, X.21 and V.36
- Synchronous transmission at 2.048Mbps
- Line code: NRZ
- Control Signals: CTS always ON

Cable Adapter :

HDB26M to MB34F for V.35

HDB26M to DB25F for RS-530

HDB26M to DB37F for RS-449(V.36)

HDB26M to DB15F for X.21



Single Modular Port E1 CSU/DSU w/ LCD and SNMP ETU01A

The ETU01A single port stand-alone DSU/CSU provides our best digital access solution for E1 and Fractional E1 network services termination. A DTE device may be linked to an ETU01A at data rates of 56Kbps to 2048Kbps. The ETU01A features user replaceable dataport modules for a number of interface standards; including Ethernet bridge, router, V.35, X.21, RS-530, RS-449, G.703 64Kbps Co-directional and RS-232. The ETU01A supports local control and diagnostics via LCD display, keypad and LED status indicators located on the front panel as well as via a menu driven RS-232 console port in conjunction with a standard terminal.

These features enable users to easily configure the unit, execute the in-service diagnostics and monitor the network status. The ETU01A provides optional SNMP (Simple Network Management Protocol), which allows the user to remotely control, diagnose and monitor the system using industry standard SNMP protocol, our proprietary MIB-II, and any network management software.

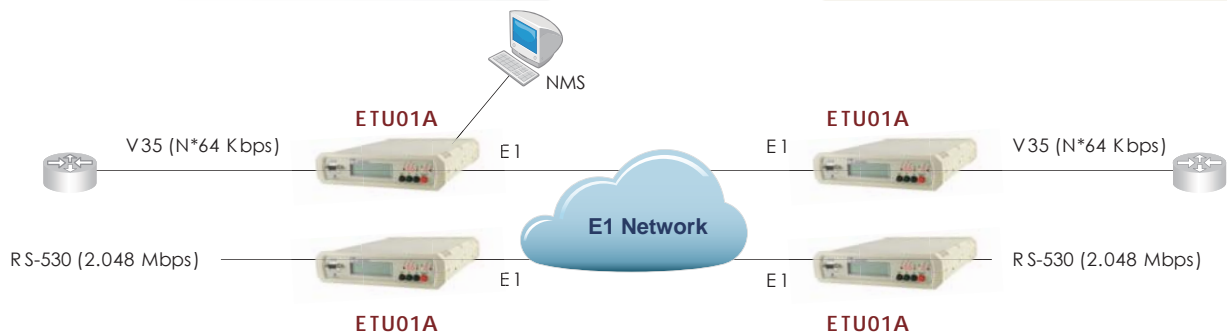
Features

- Supports Fractional E1 and Unframed E1 service with EOC control
- Removable interfaces, support V.35, X.21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Supports Console, Telnet and SNMP management
- Menu keys and LCD display
- SNMP V1, V2C, V3 supported
- Supported by EMS
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1 Specifications

Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
Line Code	AMI/ HDB3
LCD display	16*2 character LCD with backlight
Bit rate	N*56K or N*64Kbps, where N=1~31 in CCS or 1~30 in CAS
Relative receive level	0 to -43dB
Transmit level:	
Pulse	Nominal 2.37V ±10% for 75ohm
Amplitude	Nominal 3.00V ±10% for 120ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connectors	BNC(unbalanced), RJ-48(balanced)
Clock modes:	
Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE
Clock mode 2	Receive clock to the sync and transmit (DTE1) clock from the sync device
Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
Diagnostics	local loopback, Digital remote loopback, Test pattern
Indications	LEDs (Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm)
Standards	ITU-T G.703/G.704/G.706 & G.732
Power Input	AC: 90-250VAC, DC: 18-72 VCD
Power Consumption	10W
Dimensions	250 x 195 x 45mm (D x W x H)
Weight	1.5kg
Temperature	0 ~ 50°C (Operating), -1 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, LVD, RoHS
MTBF	65,000 hrs



Ordering Information

Model Name	Type	Description
ETU01A/AC	Power	1U, 19/2", Data port to framed E1 w/ 100 ~240VAC
ETU01A/DC	Power	1U, 19/2", Data port to framed E1 w/ -48VDC
ETU01A/AD	Power	1U, 19/2", Data port to framed E1 w/ -48VDC and 100 ~240VAC

Note: Please refer to page xx for optional interface module

ETU01A / ☐ ☐
Example: ETU01A / AC

Single Modular Port E1 CSU/DSU ETU011

The ETU011 stand-alone DSU/CSU is a digital access unit for Unframed E1, Fractional E1, or Fractional cascaded E1 service. The ETU011 data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU011 packs the data channels into the E1 link in user-selected time slots. The unused time slots can insert IDLE code (in frame mode). The ETU011 front panel sports status LEDs for monitoring both the CSU and DSU conditions and push button switches for initiating local and remote loopback with integral BERT.

Features

- Supports Fractional E1 and Unframed E1 service
- Removable interfaces, support V.35, X21, RS-530, RS-449, RS-232, G.703 Co-directional, NRZ, Ethernet Bridge and Router
- I/O connectors on rear panel
- Multiple clock source selection
- (Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback

Specifications

G.703 E1 Specifications

Framing	Framed CCS (PCM31) CAS (PCM30) / UnframedCRC4 on/off
Line Code	AMI/ HDB3
Relative receive level	0 to -43dB
Transmit level :	
Pulse	Nominal 2.37V \pm 10% for 75ohm
Amplitude	Nominal 3.00V \pm 10% for 120ohm Zero amplitude \pm 0.1V
Jitter performance	According to ITU-T G.823
Connectors	BNC(unbalanced), RJ-48(balanced)
Clock modes :	
Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync. DTE
Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync. DTE
Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync. device
Clock mode 3	Receive and transmit clock from the (DTE2) sync. DCE (from ETC and ERC pin)
Clock mode 4	Receive and transmit clock from the (DTE3) sync. DCE (all from ETC pin)
Test Switches	Digital local loopback, Analog local
Diagnostics	Digital local and remote loopback, Analog local loopback, Test pattern
LEDs	(Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm)
Standard	ITU-T G.703/G.704/G.706 & G.732
Power Input	AC: 90-250VAC, DC: -18 ~ -75VDC
Power Consumption	10W
Dimensions	250 x 195 x 45mm (D x W x H)
Weight	0.51kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Indications

Standard

Power Input

Power Consumption

Dimensions

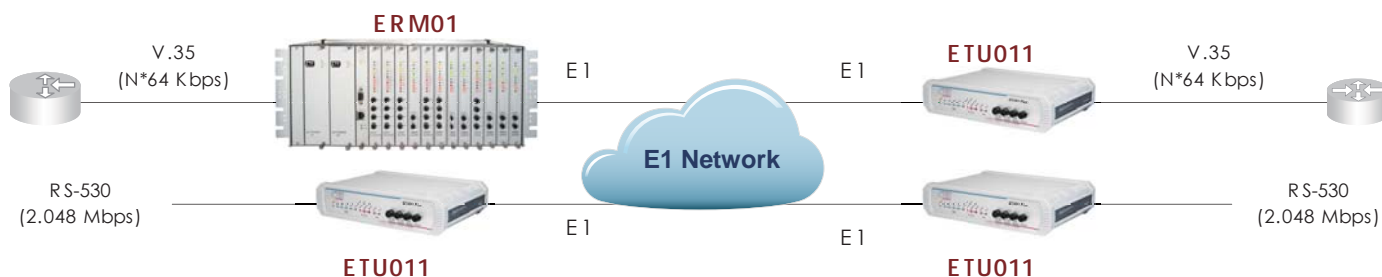
Weight

Temperature

Humidity

Certification

MTBF



Ordering Information

Model Name Type Description

ETU011-AC Power 1U, 19/2", Data port to framed E1 w/ built-in AC 90 ~ 250 VAC

ETU011-DC Power 1U, 19/2", Data port to framed E1 w/ built-in DC -18 ~ -72 VDC

Note: Please refer to page 4-13 for optional interface module

ETU011 - ☐ ☐

Example: ETU011 - AC



Single V.35 Port E1 CSU/DSU ETU01-Plus

The ETU01-Plus stand-alone DSU/CSU is a digital access unit for Unframed E1 or Fractional E1 service. The ETU01-Plus data channel supports user-selectable transmission rates via randomly selected E1 timeslots, which provides integral multiples of 64kbps, up to a maximum 2.048Mbps (unframed), for a line attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The ETU01-PLUS packs the data channels into the E1 link in user-selected time slots. The ETU01-Plus front panel sports status LEDs for monitoring the CSU and DSU conditions and pushbutton switches for initiating local and remote loopback with integral BERT. The ETU01-Plus features a fixed on-board V.35 interface.

Features

- Supports Fractional E1 and Unframed E1 service with EOC control
- Model with fixed V.35 interface for price critical applications
- I/O connectors all located on rear panel
- Multiple clock source selection
(Internal or External: E1 recovery, DTE or DCE)
- Built-in BERT with V.54 diagnostic capabilities for performing local and remote loopback
- Fixed V.35 port with MB34F connector

Specifications

G.703 E1 Specifications

Framing	Framed CCS (PCM31) CAS (PCM30) / Unframed CRC4 on/off
Line Code	AMI/ HDB3
Data rate	N*56K or N*64Kbps, where N=1~31 in CCS or N equal 1~30 in CAS
Relative receive level	-43dB
Transmit level	
Pulse	Nominal 2.37V ±10% for 75 ohm
Amplitude	Nominal 3.00V ±10% for 120 ohm Zero amplitude ±0.1V
Jitter performance	According to ITU-T G.823
Connectors	BNC(unbalanced), RJ-48(balanced)
Clock modes :	
Clock mode 0	Receive & transmit clock (DCE1) (recovered) to the sync DTE
Clock mode 1	Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE
Clock mode 2	Receive clock to the sync. and transmit (DTE1) clock from the sync device
Clock mode 3	Receive and transmit clock from the (DTE2) sync DCE (from ETC and ERC pin)
Clock mode 4	Receive and transmit clock from the (DTE3) sync DCE (all from ETC pin)
LEDs	(Power, TD, RD, RTS, DCD, Singal loss, Sync loss, Alarm)
Standards	ITU-T G.703/G.704/G.706 & G.732
Power Input	AC: 90-250VAC , DC: -18 ~ -75 VDC
Power Consumption	10W
Dimensions	195 x 160 x 45mm (D x W x H)
Weight	0.51kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	55,000 hrs

Indications

Standards

Power Input

Power Consumption

Dimensions

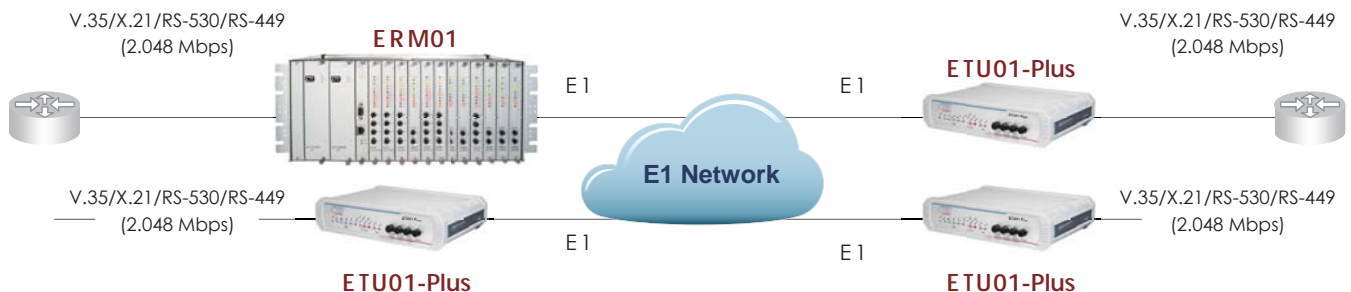
Weight

Temperature

Humidity

Certification

MTBF



Ordering Information

Model Name Type Description

ETU01/Plus-AC Power 1U, 19/2", Fixed V.35 port to framed E1 w/ built-in AC 90 ~ 250 VAC

ETU01/Plus-DC Power 1U, 19/2", Fixed V.35 port to framed E1 w/ built-in DC -18 ~ -75 VDC

ETU01/Plus - ☐ ☐

Example: ETU01/Plus - AC

Interface Modules for ETU Family Access Units

ETU/TTU



When purchasing one of our single or multi-port access units or multiplexers that support user replaceable interface modules, our ETU/TTU interface modules provide easily selectable electrical interfaces for a wide selection of user applications. In addition to standard datacom interfaces such as V.35, RS-530, X.21, RS-449, etc. Ethernet modules are also available for bridging or routing of Ethernet over E1 or T1 network services.

V.35 Interface ETU/TTU-V35



Features :

Compliant with ITU-T V.35 standards
Winchester type 34-pin MB34 M-Block female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to ITU-T V.11 (RS-422)

RS-232 Interface ETU/TTU-232



Features :

Compliant with EIA RS-232-C (Unbalanced)
Compatible to ITU-T V.24 25-pin D Sub female connector
Synchronous data rate at 64 or 128Kb/s Asynchronous (transparent) at up to 19.2K or 38.4K Data Communications Equipment interface

RS-530 Interface ETU/TTU-530



Features :

Compliant with Category 1 EIA-530 (Balanced) 25-pin D Sub female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to RS-422

X.21 Interface ETU/TTU-X21



Features :

Compliant with ITU-T X.21 standard (Balanced)
15-pin D Sub female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to V.11

RS-449(V.36) Interface ETU/TTU-449



Features :

Compliant with EIA/TIA-530-A (Balanced)
37-pin D Sub female connector
Synchronous data rate at Nx64 (where N=1 to 32)
Data Communications Equipment interface Electrically compatible to RS-422

Non-Return to Zero Interface ETU/TTU-NRZ



Features :

4 BNC connectors: TxD, TxC, RxD and RxC (Data&Clock)
NRZ line coding Logic "1" 0V +/- 0.3V Logic "0" -1.5V +/- 0.3V
Synchronous data rate Nx64 (where N=1 to 32)

G.703 64K Co-directional Interface ETU/TTU-G64



Features :

Pulse shape compliant with ITU-T G.703
Clock frequency: 64KHz
Pulse Amplitude: 1.0V
Zero Amplitude: 0V
Impedance: 120 Ohms
15-Pin D Sub connector
Range: up to 800m with 24AWG

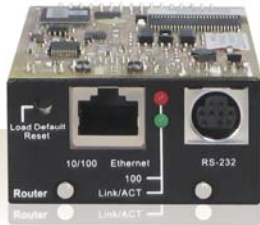


Ordering Information

Model Name	Description
ETU/TTU-V35	V.35 interface module
ETU/TTU-X21	X.21 interface module
ETU/TTU-530	RS-530 interface module
ETU/TTU-449	RS-449 interface module
ETU/TTU-232	RS-232 ASYN/SYNC interface module
ETU/TTU-G64	G.703 64Kbps co-directional interface module
ETU/TTU-NRZ	NRZ interface module (4 * BNC)
ETU/TTU-ET100	10/100 Base-T/Tx Ethernet E1 Bridge Function interface module
ETU/TTU-ET100R	10/100 Base-T/Tx Ethernet Routing Function interface module

ETU/TTU -

Example: ETU/TTU - V35



10/100 Base-TX Ethernet Router ETU/TTU-ET100R

When the E1/T1 standalone access units are installed with an ET100R Interface, the unit is not only an access unit for E1 or T1 but also becomes a high performance WAN Router for 10/100BASE-T Ethernet extension. The ET100R Ethernet Router interface module for CTC Union's ETU/TTU Series DSU/CSU Access Units may be accessed via the RS-232 asynchronous communication port, a serial crossover cable (provided) and text based terminal emulation software (Hyper Terminal TM). Once an IP address has been established for the subnet, the ET100R may also be accessed via Telnet or web GUI. The serial port and Telnet configuration CLI are identical and may include password protection.

Features

- Ethernet port IP Address/subnet mask
- WAN port IP Address/subnet mask
- Router Name / Password
- RS-232 Console Port Management
- Web/Telnet Management
- WAN port IP address/subnet mask
- DHCP server/client
- NAT Function
- Virtual Server Mapping
- SNMP MIB-2 supported
- Supports VPN pass through
- Forwarding IP multicast support
- DNS proxy server
- SNTP supported
- Simple Statistical
- Ping and Trace route
- Static Routing Setup
- Routing Table (manually set up to 32 entries minimum)
- Dynamic Routing RIP I & II, Send or Receive on Ethernet or WAN
- PPP, HDLC and Cisco HDLC WAN protocol encapsulation
- Flash Upgrade (via TFTP)

Specifications

Hardware	Samsung ARM9 integrated communications 166MHz processor, 8MB Flash, and 32MB pipeline RAM for code, data and buffers
WAN Speed	Synchronous Port N56/N64 up to 2048Kbps
LAN Speed	Ethernet LAN port 10/100 Mbps
Function	Static Routing, Dynamic Routing, DHCP Client/ DHCP Server, IP Mapping, Packet Filtering
Protocols	PPP, NAT, RIP 1/2, TCP/IP
Security	PAP/CHAP, NAT, Filter
LED	Link/ACT : On=link ; Flash=Activity 100 : On=100Base ; Off=10Base

CLI Commands

```
ET100R#show interface summary

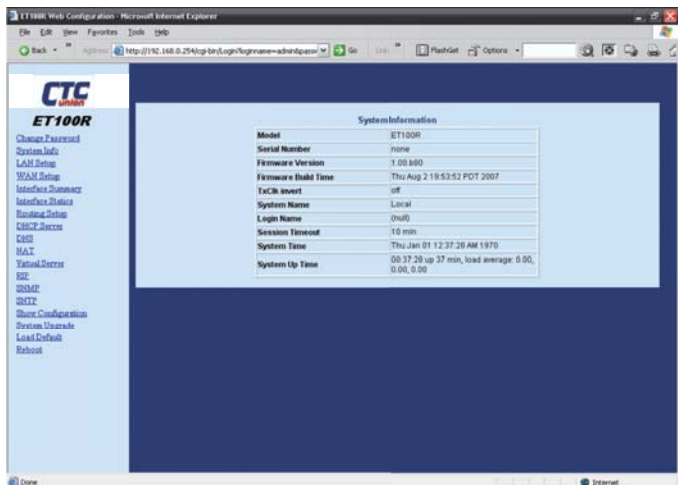
name      hw type  hw addr      ip addr      ip mask      status
eth1      Ethernet 00:02:AB:06:00:01 192.168.0.1 255.255.255.0 up
hdlc1     Cisco HDLC ----- 192.168.1.1 255.255.255.192 up
lo        Loopback ----- 127.0.0.1   255.0.0.0   up

ET100R#show ip route

Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
192.168.1.0 0.0.0.0 255.255.255.192 U 0 0 0 0 hdlc1
192.168.0.0 0.0.0.0 255.255.255.0 U 0 0 0 0 eth1

ET100R#
```

Web GUI Management



Ordering Information

Model Name	Description
ETU/TTU-ET100R	10/100 Base-Tx Ethernet Routing Function interface module

10/100 Base-TX Ethernet Bridge

ETU/TTU-ET100



The ET100 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. ET100 provides an Ethernet (IEEE802.3u) Bridge function over the WAN when matched to another ET100 module, ET100 standalone, or a compatible bridge utilizing standard HDLC (ISO 13239) protocol. The interface connection is a shielded RJ-45 connector for 10/100Base Ethernet and auto-MDIX and operates at any n56/n64 fractional or unframed E1 speed.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension.
- Auto-MDI/MDIX detects and corrects crossed cable.
- Ethernet LAN Interface on RJ-45 connector.
- Transparent half / Full duplex support on WAN / LAN interface.
- Automatic LAN table learning and aging.
- IEEE 802.3x flow control.
- Filter mode (pure bridge) or repeater mode selectable
- Provides Ethernet over E1 economically
- No IP address settings required
- Simple DIP switch setting to control filtering, packet buffer and Ethernet auto/forced mode

Specifications

Bridge	LAN Table: 256 MAC address with 5 minute automatic aging Filtering and Forwarding : wire speed Packet size: 64~1522 Bytes Buffer : 340 frames Delay : 1 frame
LAN	Standard : compliant to IEEE802.3 /802.3u Data rate : 10Base-T / 100Base-TX, Full or Half Duplex Connector : RJ45
General	IP bridging over G.703 E1 ISO standard HDLC encapsulation WAN Speed: Nx64 (where N=1 to 31) for Fractional E1 2048Kbps for Unframed E1



Ordering Information

Model Name	Description
ETU/TTU-ET100	10/100Base-T/Tx Ethernet E1 Bridge Function interface module



Ethernet over Unframed E1 with SNMP Management

Eoe1A

The Eoe1A is a Channel Service Unit for unframed ITU-T G.703 E1 that features a built-in Ethernet bridge. The CSU has a built-in Network Terminating Unit (NTU) and may connect to either 75 Ohm unbalanced, BNC connectors or to 120 Ohm balanced, unframed E1 via twisted pairs and a shielded RJ-45 connector. The Eoe1A Ethernet Bridge uses HDLC encapsulation to transport Ethernet packets across the WAN and supports 10/100 auto-negotiation or manual settings for 10M, 100M, Full or Half Duplex Ethernet. The Ethernet port also supports a standard auto-MDIX feature that will completely eliminate Ethernet cross-over cables or the guessing that is sometimes involved in choosing a cable when connecting to a HUB or a PC. The Eoe1A is very easy to configure by a menu driven serial console interface. SNMP and proprietary MIB add the ability to manage the Eoe1A centrally through third party network management software or via CTC Union's EMS management system.

Features

- Supports 10/100Base-TX Ethernet over Unframed E1
- Automatic address learning, aging and deletion after 5 minutes
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Forwarding and filtering rate at WAN speed with throughput latency of 1 frame
- Auto MDI / MDIX
- Real-time filtering with 256 MAC address table
- Supports Console, SNMP and Web management
- Adjustable pay load rates of: 10K, 32K, 64K, 128K, 256K, 512K, 1024K & 2048K

Specifications

G.703 E1 Specifications

Framing	Unframed
Line code	AMI/ HDB3
Bit rate	2.048Mbps (clear channel)
Relative receive level	0 to -43dB
Transmit level	Pulse Nominal 2.37V $\pm 10\%$ for 75ohm Amplitude Nominal 3.00V $\pm 10\%$ for 120ohm Zero amplitude $\pm 0.1V$

Jitter performance	According to ITU-T G.823
Connector	BNC(unbalanced), RJ-48(balanced)
Clock modes	Clock mode 0 Receive & transmit clock (DCE1) (recovered) to the sync DTE Clock mode 1 Receive & transmit clock (DCE2) (internal oscillator) to the sync DTE

Diagnostics

Test Switches	Digital local loopback, Analog local loopback, Digital local and remote loopback, 2047 Test pattern
---------------	---

Ethernet Specifications

Connector	RJ-45
Data Rate	10/100Mbps; Half Duplex / 20/ 200Mbps; Full duplex
Filtering & Forwarding	90,000 packets/sec
Delay	1 frame
Frame Buffer	340 frames
MAC Table	256 MAC address
Protocol	Synchronous HDLC
Indications	LEDs (Power, Signal Loss, Alarm, Link, TD, RD, 100, Full, Error, Error, Test)

Standard

Management

AC: 90-250VAC ; DC: 18-72 VCD

Power Consumption

20W

Dimensions

250 x 195 x 45mm (D x W x H)

Weight

1.5kg

Temperature

0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)

Humidity

10 ~ 90% non-condensing

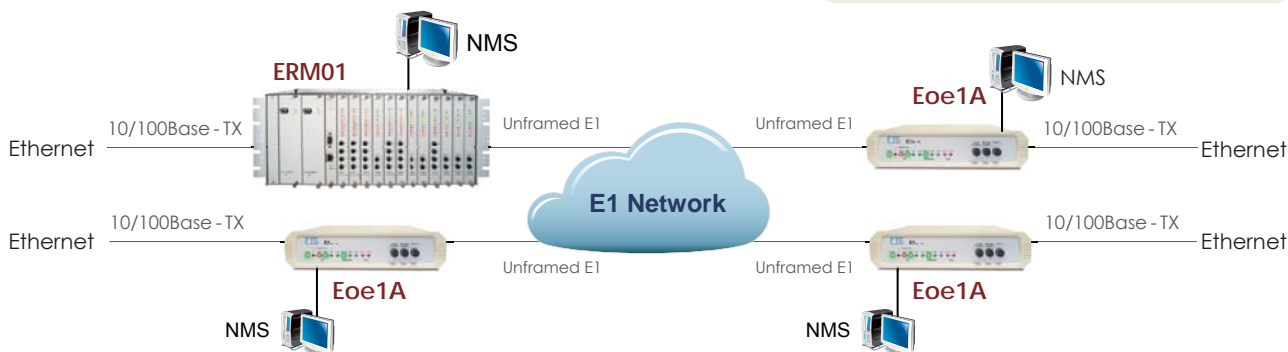
Certification

CE, FCC, RoHS

MTBF

57,000 hrs

Managed Unframed E1 Point to Point



Ordering Information

Model Name Description

Eoe1A/AC	1U half 19" Ethernet over unframed E1 SNMP with AC power (100 ~ 240 V)
Eoe1A/DC	1U half 19" Ethernet over unframed E1 SNMP with DC power (18 ~ 75 V)
Eoe1A/AD	1U half 19" Ethernet over unframed E1 SNMP with AC (100~240V) and DC (18 ~ 75 V)

Eoe1A / ☐ ☐

Example: Eoe1A / AC

Ethernet Bridge over E1

Eoe1/Plus



The Eoe1/Plus is a standalone E1 Ethernet Bridge capable of providing 1x E1 line for the connection of 10/100BaseTX LANs over E1 transports. The Eoe1/Plus transmits up to a 2.048Mbps Ethernet bridge channel (HDLC encapsulated) over E1 link. The Eoe1/Plus supports an E1 attenuation of up to 43 dB on twisted pair or coax cable. This provides an approximate operating range up to 2km (using 22AWG). The Eoe1/Plus fully meets E1 specifications including ITU-T G.703 and G.823. The Eoe1/Plus can be configured by dip switch setting and has the diagnostic capabilities for performing remote loopback. The operator at either end of the line may test both the Eoe1/Plus and the line in the digital loopback mode. The Ethernet copper interface supports auto-negotiation and auto MDI/MDIX, allowing plug-and-play Ethernet connection without any additional configuration.

Features

- Connects one Fast Ethernet over E1 links (1.984Mbps)
- Built-in HDLC bridge operates at WAN rate
- Auto-Negotiation
- Unbalanced E1/BNC or balanced E1/RJ45
- Easily configure with simple DIP switches
- AC / DC power built-in
- LED Alarm indication

Specifications

Interface

E1:

Framing	CAS, CCS, Unframed/framed
Standard	ITU-T G.703/G.704/G.706 & G.732, G.823
Bit rate	2.048Mbps± 50ppm
Line code	HDB3
Clock setting	Internal OSC or recovery clock
Receive level	-43dB
Line impedance	75 ohm (BNC) / 120 ohm (RJ45)
Jitter Performance	Complies with ITU-T G.823
Pulse Mask	Complies with ITU-T G.703
Pulse amplitude	Nominal 2.37V ± 10% (75 ohm) Nominal 3.00V ± 10% (120 ohm)
Connector	RJ45, BNC
Diagnostics	Digital remote loopback

Ethernet:

Standard	IEEE 802.3, 802.3u
Data rate	10/100Base-TX, Half/Full duplex
Connector	RJ45

Indications

Power, ALM, E1 signal loss ,
E1 Alarm (AIS , LOF , RAI, LOMF),
LAN link /ACT, 10/100M , SD(100Base-FX)

Power Input

AC 100 ~ 240V; 4DC

Power Consumption

< 5W

Dimensions

201 x 135 x 35mm (D x W x H)

Weight

0.58kg

Temperature

0°C ~ 60°C (Operating), -10°C ~ 70°C (Storage)

Humidity

10 ~ 90% RH (non-condensing)

Certifications

CE, FCC, RoHS

MTBF

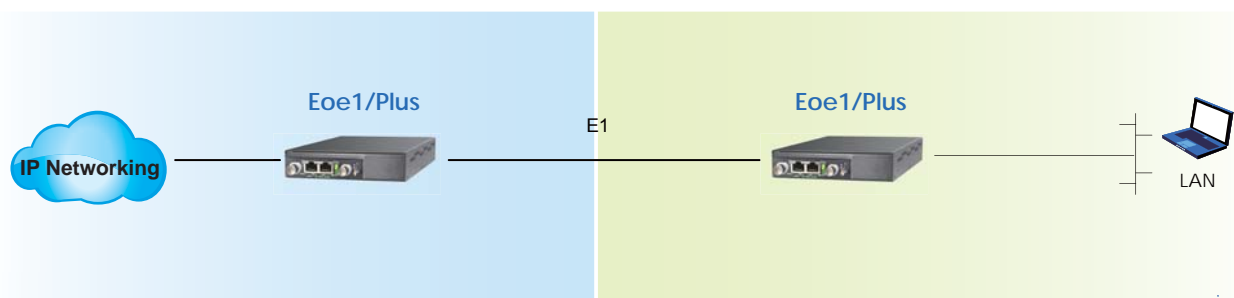
65,000 hrs

E1 Bridge

Delivering point-to-point Fast Ethernet service across E1 circuit

Central Office (CO)

Customer Premise Equipment (CPE)



Ordering Information

Model Name

Description

Eoe1/Plus-AC

Ethernet over E1 with AC Power (100~240 V)

Eoe1/Plus-DC

Ethernet over E1 with DC Power (18 ~ 75 V)

Eoe1 / Plus- ☐ ☐

Example: Eoe1 / Plus-AC



Ethernet to WAN (V.35, RS-530, RS-449, X.21) Bridge ET100

The ET100 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over bit stream type infrastructures. The built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64(56)Kbps related data equipment. Several options of data interfaces, including V.35, RS-530, RS-449, X.21 and RS-232, make this unit's connection between 10Base-T or 100Base-TX LAN and various data port interfaces convenient.

Features

- High performance bridge for 10Base-T or 100Base-TX Ethernet extension
- Auto MDI/MDIX
- Selectable data port : V.35, X.21, RS-530, RS-449, RS-232
- Transparent half / Full duplex support on WAN, LAN interface
- Nx64, Nx56 timing clock generator for Sync WAN link
- LEDs indication for LAN, WAN status

Specifications

WAN Interface

Interface : Selectable RS-232(Sync), V.35, RS-530/449, X.21
Connector : DB25M
Type : DTE port
Data rate: • RS-232 up to 128Kbps
• V.35, X.21, RS530, RS-449 up to 2Mbps
• Nx64(56)Kbps up to 2048Kbps

LAN Interface

Clock source : Tx/Rx internal or external
• Compliant with IEEE 802.3, 802.3u
• Connector: RJ-45
• Speeds: 10/100Base-TX, Full/Half duplex
• Frames: Support 64 ~ 1522 byte packet lengths

Bridge Specifications

• Protocol: Synchronous HDLC (ISO 13239)
• Address learning, aging and deletion after 5 minutes
• 256 addresses MAC table
• 340 packet buffer

Indications

LEDs (PWR, WAN Rx/Tx, LAN Tx/Rx/Link/Err/Speed)

Standards

IEEE802.3, 802.3u

Power Input

9VDC

Power Consumption

< 5 W

Dimensions

135 x 79 x 25mm (D x W x H)

Weight

0.15kg

Temperature

0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)

Humidity

10 ~ 90% non-condensing

Certification

CE, FCC, RoHS

MTBF

55,000 hrs

Ethernet to Data Point to Point



Ordering Information

Model Name

Description

ET100

Compact size, Ethernet to WAN (V.35, X.21, RS-530, RS-449) bridge w/ DC 9V in AC adapter

Optional Accessories

CAB-DB25FMB34M-V35	V.35 adapter cable: DB25 Female to MB34 Male , 1meter
CAB-DB25FMB34F-V35	V.35 adapter cable: DB25 Female to MB34 Female , 1meter
CAB-DB25FDB15M-X21	X.21 adapter cable: DB25 Female to DB15 Male , 1meter
CAB-DB25FDB15F-X21	X.21 adapter cable: DB25 Female to DB15 Female , 1meter
CAB-DB25FDB25M-530(232)	RS-530(232) adapter cable: DB25 Female to DB25 Male , 1meter
CAB-DB25FDB25F-530(232)	RS-530(232) adapter cable: DB25 Female to DB25 Female , 1meter
CAB-DB25FDB37M-449	RS-449 adapter cable: DB25 Female to DB37 Male , 1meter
CAB-DB25FDB37F-449	RS-449 adapter cable: DB25 Female to DB37 Female , 1meter

Ethernet to NRZ Bridge

ET100/NRZ



The ET100/NRZ Network Bridge is a high performance, remote, self-learning Ethernet bridge. Its solid design makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over NRZ bit stream type infrastructures. Multiple clocking options including a built-in n x 64(56)Kbps timing clock generator makes it easy to connect to other n x 64Kbps NRZ data equipment.

Features

- 10BASE-T/100BASE-TX, Auto, Full Duplex or Half Duplex
- HP Auto-MDI/MDIX detects and corrects crossed cable
- IEEE 802.3x flow control enable/disable
- Real-time filtering with 256 MAC address table
- Automatic address learning, aging and deletion after 5 minutes
- Up to 340 packet-buffering capacity
- Forwarding and filtering rate at wire speed with throughput latency of 1 frame.
- Auto padding of undersized packets to meet the minimum Ethernet packet size requirement
- Buffering modes can be selected according to the setting of WAN and LAN line speeds
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

WAN Interface	Type: Fixed type NRZ Protocol: Synchronous HDLC (ISO 13239) Connector: 4x BNC Data rate: Nx64Kbps, up to 2048Kbps Clock source: Tx/Rx internal or recovery from NRZ
LAN Interface	<ul style="list-style-type: none">• Compliant with IEEE 802.3, 802.3u• Connector: RJ45• Data rate: Nx64Kbps• Speeds: 10/100Base-TX, Full/Half duplex• Frames: Support 64 ~ 1536 byte packet lengths
Bridge Specifications	<ul style="list-style-type: none">• Protocol: Synchronous HDLC (ISO 13239)• Address learning, aging and deletion after 5 minutes• 256 addresses MAC table• 340 packet buffer
Indications	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standards	IEEE802.3, 802.3u, ISO 13239
Power Input	AC: 100 ~240V, DC 18 ~ 72V
Power Consumption	<15W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.95kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet to NRZ Point to Point



Ordering Information

Model Name	Description	ET100/NRZ – <input type="checkbox"/> <input type="checkbox"/>
ET100/NRZ-AC	10/100BaseTx Ethernet to NRZ BNC interface with Internal AC 100~240V power	Example: ET100/NRZ – AC
ET100/NRZ-DC	10/100BaseTx Ethernet to NRZ BNC interface with Internal DC 18~72V power	



Ethernet to G.703 Co-Directional 64K Bridge ET100/G64

The ET100/G64 Network Bridge is a high performance remote, self-learning, Ethernet bridge. Its compact size and low cost makes it ideal for cost-sensitive bridging applications, or as a LAN extender or segmenter over legacy 64Kbps co-directional bit stream type infrastructures. Multiple clock source settings including a built-in 64Kbps timing clock generator makes it easy to connect to other 64Kbps G.703 co-directional data equipment, making this unit's connection between 10Base-T or 100Base-TX LANs convenient.

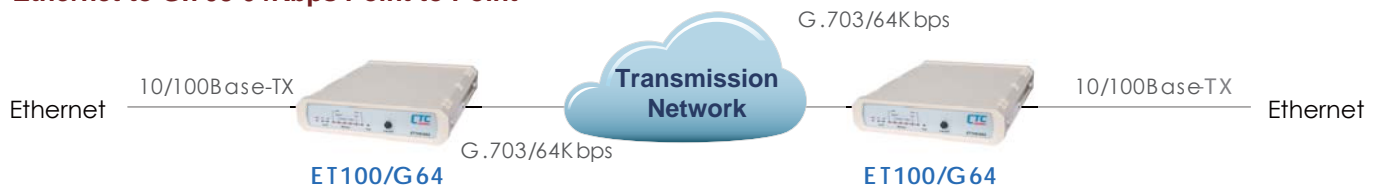
Features

- 10/100Base-TX, Full Duplex or Half Duplex
- Auto MDI/MDIX
- IEEE 802.3x flow control
- Real-time filtering with 256 MAC address table
- Auto address learning, aging and detection after 5 mins
- up to 340 packet-buffering capacity
- Built-in nx64K / nx56K timing clock generator for WAN link

Specifications

WAN Interface	Type: Co-directional 64Kbps Line code: Co-directional Line: 4 wires 19 to 26 AWG Range: up to 800 meters over 24 AWG Impedance: 120 ohms Pulse Amplitude: Nominal 1.0V±10% Zero Amplitude: Nominal 0V±0.1V Clock Frequency: ±100ppm Connector: RJ45 Frame format: Unframed
LAN Interface	<ul style="list-style-type: none"> • Compliant with IEEE 802.3, 802.3u • Connector: RJ45 • Data rate: 64Kbps • Speeds: 10/100Base-TX, Full/Half duplex • Frames: Support 64 ~ 1536 byte packet lengths
Bridge Specifications	<ul style="list-style-type: none"> • Protocol: Synchronous HDLC (ISO 13239) • Address learning, aging and deletion after 5 minutes • 256 addresses MAC table • 340 packet buffer
Indications	PWR, TD/RD, Link, LAN Rx/Tx, 100M, Full, Err, Test
Standard	IEEE802.3, 802.3u, ITU-T G.703, G.823
Power Input	AC: 100 ~240V, DC 18~72V
Power Consumption	< 5W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	0.95kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC, RoHS
MTBF	57,000 hrs

Ethernet to G.703 64Kbps Point to Point



Ordering Information

Model Name	Description
ET100/G64-AC	Ethernet to G.703 Co-directional 64K bridge with AC power
ET100/G64-DC	Ethernet to G.703 Co-directional 64K bridge with DC power

ET100/G64 – ☐ ☐
Example: ET100/G64 – AC

4U, 10 I/O Slot Data, Ethernet, Voice E1 Managed Multiplexer

ERM-MUX-PLUS



The ERM-Mux / plus is a 4U 19(23)" 14 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which is designed for non-stop operation. There are 10 slots available for hot-swappable ERM-Mux / plus-I/O cards. Two slots are provided for Mux-E1 cards, which may be configured as four separate E1 links or for redundant 1+1 operation of the E1 lines, safe guarding against expensive network down time. Two slots are also available for CPU cards, with the second CPU card acting as a hot standby in case of primary card failure. Each Mux-E1 card may be linked to another ERM-Mux / plus Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ERM-Mux/plus optionally accommodates up to two separate powerplplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ERM-Mux/plus provides all interface connections on the front panel. BNC and RJ-45 are used for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703-64K co-directional / contra-directional / center. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 6xRS-232, HP68F DCE port of I/O card to 4x V.35, RS-232, RS-530, RS-449, RS-422 and X.21 or 5x X.50 channels.

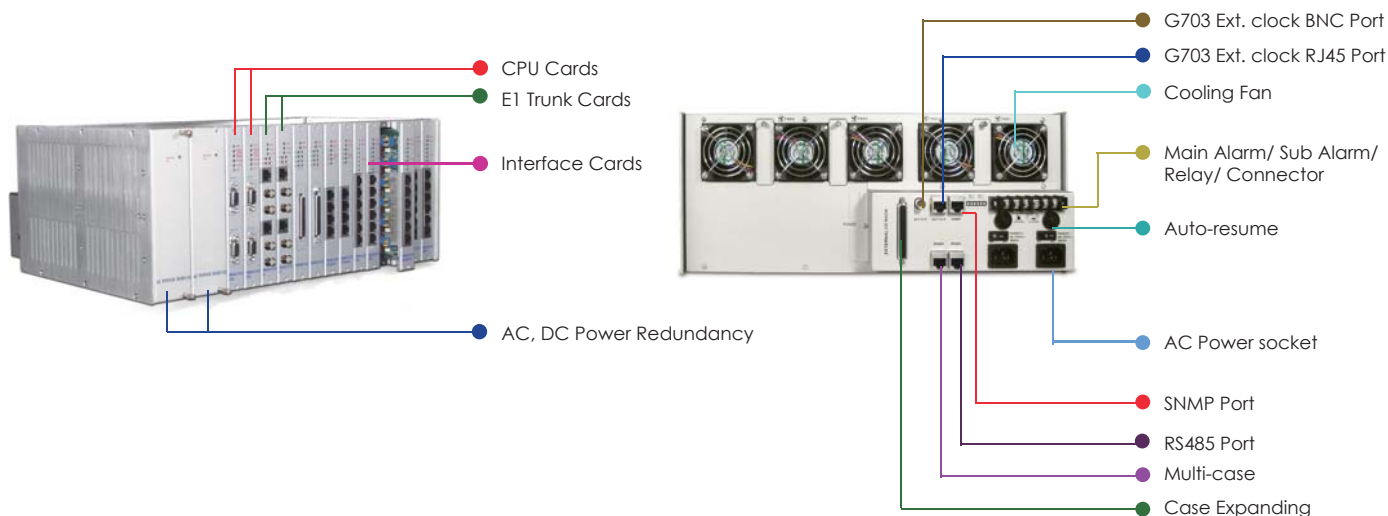
Features

- CPU redundancy (1+1)
- E1 redundancy (1+1) and E1 card redundancy
- Power redundancy (1+1) [2AC, 2DC, AC+DC]
- DCE hot swappable card types
- 4ch V.35 (nx64K)
 - 4ch G.703 64K co-directional /contra-directional / center mode
 - 2ch Ethernet bridge
 - 6ch RS232
 - 6ch FXS voice
 - 6ch FXO voice
 - 6ch E&M voice
- Drop & Insert function
- Console, NMP,SNMP, management

Specifications

Connectors	Console port (RJ45, RS232C) WAN port RJ45 Jack (2-wire, 4-wire)
Physical Specifications	Dimensions: 350 x 438 x 176mm (W x D x H) Weight: 8kg (chassis+dual power+8 I/O cards) 0.45kg per card
Power Characteristics	AC : AC 90 ~250VAC, DC : DC -48VDC
Environmental Specifications	Operating 0°C ~ 60°C Storage 0°C ~ 70°C Relative humidity 0% ~ 90% non-condensing Predicted MTBF : 65,000 hrs (25°C)
Certification	CE

ERM-Mux/plus overview



1+1 Redundant

The ERM-MUX/PLUS supports complete redundant functions for the electrical input service, the power module cards, CPU card and E1 card. The E1 backup provides 1+1 modes. All of these cards are capable of automatic switchover in case of failure. The system has complete warning and diagnostic functions for stable and reliable operation.

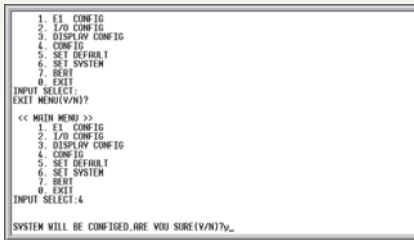
Network Management

The ERM-MUX/PLUS supports SNMP and/or NMP GUI network management with local PC or via a dedicated timeslot from the E1 line. The NMP GUI can manage more ERM-MUX/PLUS equipment via the E1 network in-line or in nested structures. A console terminal mode is supported as well. When SNMP management mode is available and selected, remote Telnet and HTTP embedded web server are also available for management.

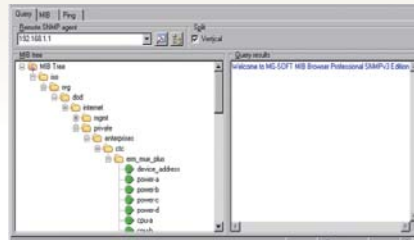
ERM-Mux/Plus Management

The intelligent NMS provides the support that the network manager needs. It consists of three parts :

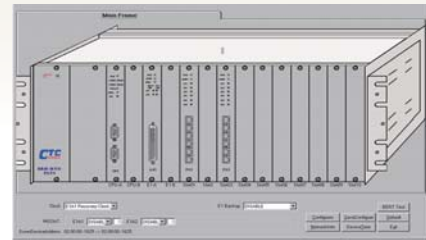
1. Terminal mode: Configuration by local RS-232 serial port; Maintenance & alarm.



2. MIB file SNMP: Configuration by RJ-45 10/100 Ethernet port; Complies with MIB-II standard.



3. GUI SNMP: Configuration by RJ-45 10/100 Ethernet port; Real time monitoring & trap alarm in Window® graphic mode.



Cascade

RS-485 interface is used for cascading expansion rack, and are provided by RJ-45 x 2 connectors. DB62 connector for connecting backplane data to expansion rack.

Power Redundancy

Power supply options for 110V AC, 220V AC or -48V DC, ensure maximum flexibility for central office installations. This equipment complies fully with all ITU-T standards for E1 transmissions. The modules are hot-swappable, capable of automatic switch over in case of module failure, stable, and reliable.

Performance and BERT test

System supports performance monitoring and BERT test through NMP or Terminal console according RFC 1406 recommendation. CRC-4 and BPV monitoring: CURR ES / UAS , LONG ES / UAS. Loopback test and BERT test: display Rx error amounts, Error counts and Bit-error-rate. Test patterns: 2e9-1, 2e11-1 and 2e15-1. Error Insertions and rates: Single, 10e-1, 10e-2, 10e-3, 10e-4, 10e-5, 10e-6, 10e-7.



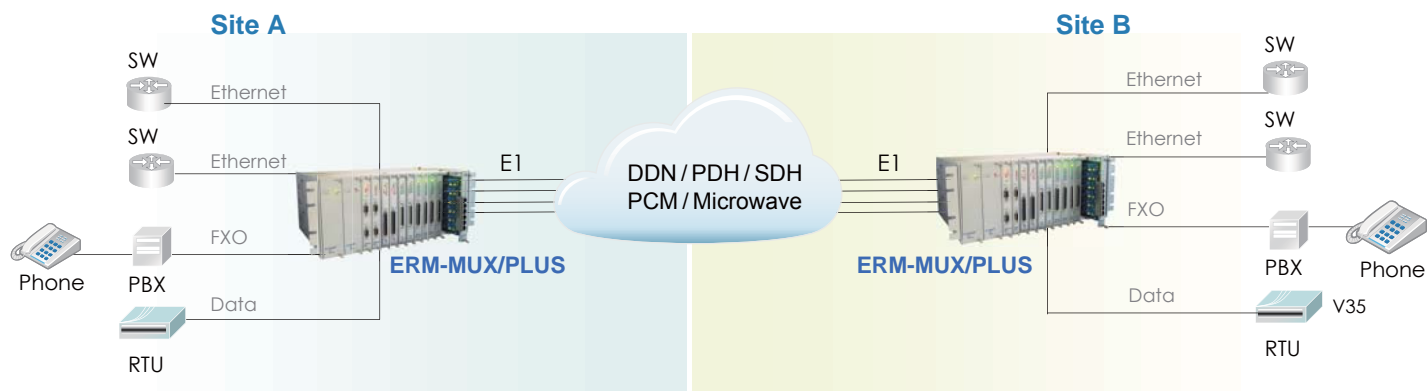
Ordering Information

Model Name	Type	Description
ERM-MUX-PLUS/AA-CH	Chassis	4U 19" 14 slot Chassis for AC+AC power
ERM-MUX-PLUS/DD-CH	Chassis	4U 19" 14 slot Chassis for DC+DC power
ERM-MUX-PLUS/AD-CH	Chassis	4U 19" 14 slot Chassis for AC+DC power
ERM-MUX/AC	Power	AC Power plug-in module (90 to 250 VAC)
ERM-MUX/ACV	Power	AC Power plug-in module (90 to 250 VAC) with Voice support
ERM-MUX/DC	Power	DC Power plug-in module (±36 to ±76 VDC)
ERM-MUX/DCV	Power	DC Power plug-in module (±36 to ±72 VDC) with Voice support
ERM-MUX-PLUS/GUI	Management	GUI for ERM; support Windows 95, 98, 2000, XP
ERM-MUX-PLUS-2E1R	Card	2 Ch Main-E1 LTU card(V1.2); w/DB37M to 2xRJ45 cable
ERM-MUX-PLUS-2E1B	Card	2 Ch Main-E1 LTU card(V1.2); w/DB37M to 2xBNC cable
ERM-MUX-PLUS-4E1R	Card	4 Ch Main-E1 LTU card(V1.2); w/DB37M to 4xRJ45 cable
ERM-MUX-PLUS-4E1B	Card	4 Ch Main-E1 LTU card(V1.2); w/DB37M to 4xBNC cable
ERM-MUX-PLUS-8E1R	Card	8 Ch Main-E1 LTU card(V1.2); w/DB37M to 8xRJ45 cable
ERM-MUX-PLUS-8E1B	Card	8 Ch Main-E1 LTU card(V1.2); w/DB37M to 8xBNC cable
ERM-MUX-PLUS-CPU	Card	CPU card (V4.3) for NMP management
ERM-MUX-PLUS-SNMP	Card	SNMP card (V2.2) for NMP management
ERM-MUX-PLUS-FXO	Card	6 Ch FXO interface card(V2.1)
ERM-MUX-PLUS-FXS	Card	6 Ch FXS interface card(V4.1)
ERM-MUX-PLUS-E&M	Card	6 Ch 2/4 wires E&M voice interface card (V4.1)
ERM-MUX-PLUS-RS-232	Card	6 Ch RS-232 interface card (V4.0)
ERM-MUX-PLUS-G64K	Card	4 Ch G.703 64k interface card (V4.0)
ERM-MUX-PLUS-HS-SERIAL	Card	4 Ch V.35/X.21/RS-449/RS-530 interface card
ERM-MUX-PLUS-RS485	Card	6 Ch RS-485 / RS-422 Interface card
ERM-MUX-PLUS-ET100	Card	2 Ch Ethernet(10/100Base Tx) interface card (V4.0)

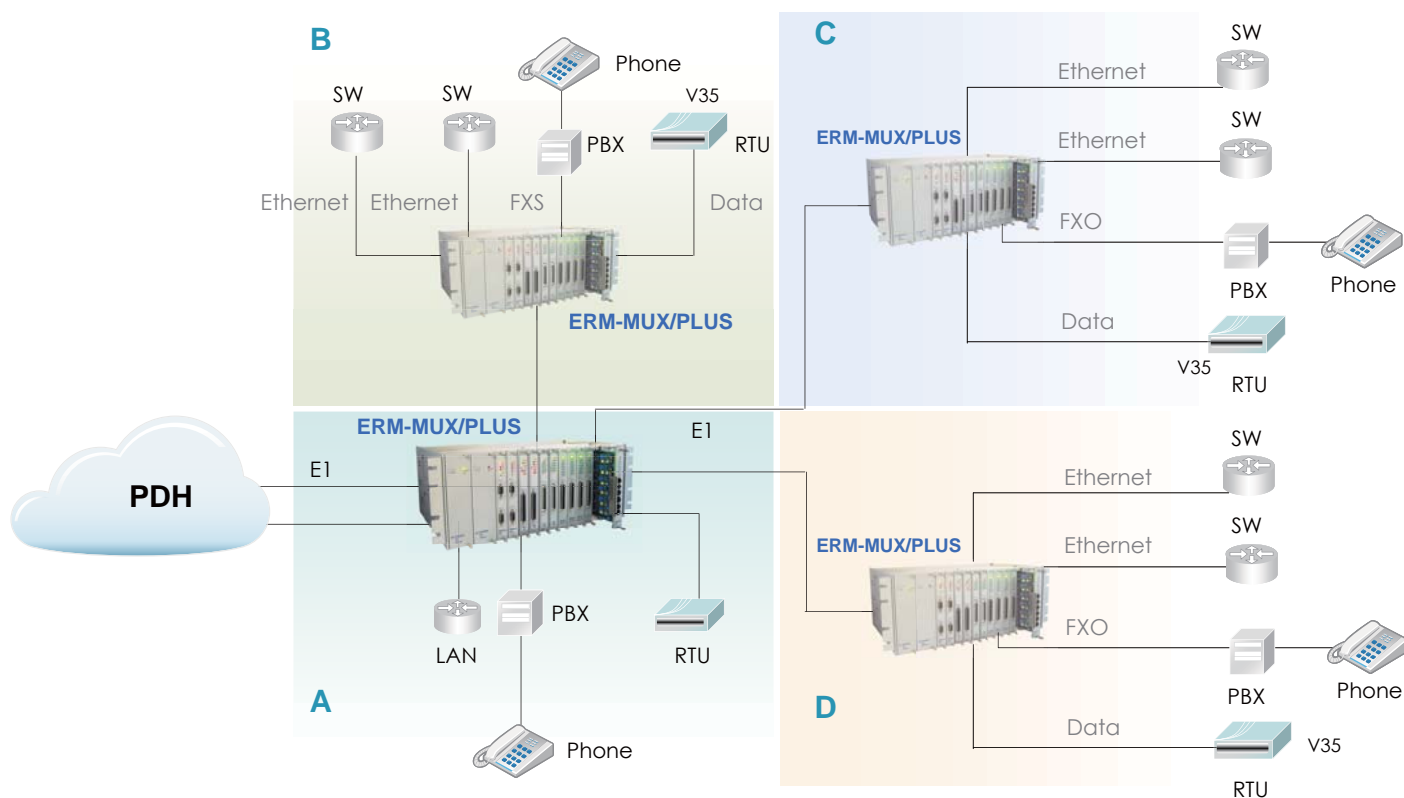
ERM - MUX - PLUS - ☐☐☐☐

Example: ERM - MUX - PLUS - 2E1R

Connection with PBX (Private Branch Exchange)



The extension and expansion of DDN (Distributed Data)





G.703 E1 Aggregate Card

ERM-Mux/Plus-E1

The ERM-Mux/plus has two dedicated slots for installing E1 aggregate cards. Currently E1 cards are available with 2, 4 or 8E1 ports. In the backplane design of the ERM-Mux/plus, a maximum of 4 E1s can carry data to and from tributary (I/O) cards. One typical application could be to install two 4E1 cards in the chassis and have the cards act as one master and one hot-standby card for E1 redundancy. For other applications, an 8E1 card could be used to cross connect E1 timeslots prior to assignment to the four available backplane channels. Another application can use the 'extra' E1 aggregate channels for drop & insert (Sub-E1) rather than performing cross connection. It can quickly be seen that a large number of applications are possible with the ERM-Mux/plus's flexible design.

Features

- Available in 2, 8 E1 channels
- Supports PCM31 or PCM30 framing
- Can provide path/card redundancy
- E1 timeslots can support cross-connect function
- E1 channel can act as Sub-E1 for Drop&Insert
- Hot Swappable

Specifications

Frame format	CAS(PCM30) / CCS(PCM31)
CRC on/off	
Bit rate	2.048Mbps
Line codes	HDB3/AMI
Rx sensitivity	0 ~ -43dB
Tx driver	1.5km over 0.5mm E1 cable
Line impedance	75 ohms (unbalanced) 120 ohms (balanced)
Pulse amplitude	nominal 2.37V (75ohm) nominal 3.00V (120ohm)
Pulse shape	According to ITU-T G.703
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



CPU Control Card

ERM-Mux/Plus-CPU

CPUA and CPUB slots can insert two CPU modules that automatically work in redundant operation mode. CPU modules are responsible for all parameter setup from local PC or from the selected in-band E1line. The setup of the ERM-MUX/Plus may be accomplished by:
Local PC connected by Ethernet to SNMP
(can be extend to multiple cases with RS485 twisted-pair).
Local PC connected by serial NMP port to Windows® NMP GUI.
E1 network connected to SNMP/NMP GUI.
Local terminal console mode.

Specifications

- RS-232 port for dumb terminal at 9.6k, 8bit, no parity
- SNMP V1 and V2C support
- MIB file compliant to MIB-II ASN.1
- Firmware upgrade by TFTP
- Hot swappable

Fast Ethernet Bridge Tributary Card

ERM-Mux/Plus-ET100



The ERM-Mux/plus Ethernet Bridge Tributary Card provides Ethernet over E1 capability. Incorporating two separate channels, this transparent bridge supports industry standard HDLC encapsulation. The WAN data rate depends on the number of E1 timeslots assigned (Nx64). The front panel has two RJ-45 shielded connectors for connection of 10Base-T or 100Base-TX Ethernet and status LEDs for each channel to display link state, speed, duplex and activity. Rounding out each bridge channel are support for 256 MAC filter address learning table and 340 packets buffer to aid in handling LAN side burst traffic.

Features

- Two independent Ethernet over E1 channels
- Utilizes HDLC WAN encapsulation
- MAC Address learning table with 5 minute aging
- Auto-MDIX and Auto-Negotiation
- Hot Swappable

Specifications

Standards	IEEE 802.3, IEEE802.3u
Automatic address learning, aging and deletion after 5 min.	
Throughput latency	1 frame
MDI / MDIX	Auto
Filtering	256 MAC address table
Buffer	340 packets
Encapsulation	HDLC
10Base-T/100Base-TX,	Full or half duplex
Packet sizes	64 ~ 1522 bytes
Temperature	0°C ~ 50°C
Humidity	5 ~ 95% (non-condensing)
MTFB	65,000 hrs

Nx64 Synchronous Serial Tributary Card

ERM-Mux/Plus-Data



The ERM-Mux/plus Nx64 Serial Tributary Card provides V.35/ X.21/ RS-530/ RS-449 Synchronous data capability. Incorporating four separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single HD68 connector mates to a 1 to 4 cable that terminates to the required connector type. Four different cables provide connection to V.35's MB34, X.21's DB15, RS-530's DB25 or RS-449's DB37 female connectors. Please be sure to select the right cable for your application when ordering this card.

Features

- Four independent Synchronous channels
- Nx64 setting from any E1 channel
- Each channel operates in native DCE mode
- Diagnostic loop backs
- LED indicators for Power, Alarm, RD/TD activity
- Hot Swappable

Specifications

ITU-T and ANSI compliant Datacom interfaces	
Multiplexing Nx64K data onto E1 time-slot.	
Data speed	Nx64K(N=1 to 30, or 31).
Data access	RS-530, RS-449, V.35, X.21, supplied with corresponding interface cable.
Access mode	DCE
Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5 ~ 95%
MTFB	65,000 hrs



Asynchronous RS-485/422 Serial Tributary Card

ERM-Mux/Plus-RS485

The ERM-Mux/plus Asynchronous RS485/422 Serial Tributary Card provides six independent RS-485/ RS-422 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. Each channel uses a pluggable 4-pin terminal block for connection one or two twisted pair wires. No cables are provided with this card. When connecting to RS-485, the channel supports 4-wire Full Duplex or 2-wire Half Duplex RS-485 transmissions for serial control or data acquisition.

Features

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 128kbps
- Diagnostic loop backs
- Hot Swappable

Specifications

Interface	RS-422 4 wire, RS485 4/2 wire
LEDs	RS-485/422 TD/RD, Power, Alarm
Baud Rate	Async mode <= 128K
Bit Error Rate	Less than 10^{-10}
Connector	4pin Terminal Block x 6
Duplex	Full / Half
Temperature	0°C ~ 50°C
Humidity	5~95%
MTFB	65,000 hrs



RS232 Sync/Asyn Tributary Card

ERM-Mux/Plus-RS232

The ERM-Mux/plus Sync/Asyn RS232 Serial Tributary Card provides six independent RS-232 data channel capability. Incorporating six separate channels, each channel can independently assign any Nx64 timeslots from the aggregate E1. The single DB62 connector mates to a 1 to 6 cable that terminates to DB25 female connectors. These serial data channels may be linked to leased line modems for further extension or connected to other data terminal or data acquisition devices. When configured for synchronous use, the data connectors carry both clock and data. For asynchronous use, the clock signals can be ignored.

Features

- Six independent channels
- Nx64 setting from any E1 channel
- Transparent asynchronous rates up to 115.2kbps
- Synchronous 64 or 128Kbps, DCE mode
- Diagnostic loop backs
- LED indicators for Power, Alarm, RD/TD activity
- Hot Swappable

Specifications

ITU-T V.24 compliant Datacom interfaces	
Multiplexing Nx64K data onto E1 time-slot.	
Data speed	Nx64K(N=1 to 2).
Data access	RS-232, supplied with corresponding interface cable.
Access mode	DCE
Diagnostics	Local /Remote /Bi-directional Loop
Temperature	0°C ~ 50°C
Humidity	5~95%
MTFB	65,000 hrs

G.703 64K Co-directional Tributary Card

ERM-Mux/Plus-G64K



The ERM-Mux/plus G64K Tributary Card provides 4 independent G.703 64Kbps Co-directional data channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors that conform to USOC RJ-48C standard wiring provide the G.703 connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These data channels may be linked to multiplexers, terminal equipment or satellite/micro-wave transmission equipment. In Co-directional signaling, the clock signals are recovered from the received G.703 data stream. Only Tx and Rx pairs or a total of 4 wires are required in 64Kbps co-directional transmission.

Features

- 4 independent channels
- 1x64 setting from any E1 channel
- Transparent synchronous rate of 64kbps
- Co-directional clock recovered from Rx G.703
- Diagnostic loop backs
- LED indicators for Power, Alarm, Tx/Rx activity
- Hot Swappable

Specifications

ITU-T G.703, G.823 64kbps compliant interfaces	
Multiplexing 1x64K data onto E1 time-slot.	
Data speed	: 64Kbps +/-100ppm.
Data access	: RJ-45 per USOC RJ-48C standard
Line code	: Co-directional
Pulse shape	: according to G.703
Transmit distance	: 600M or less (0.5~0.7mm TP)
Diagnostics	: Local /Remote /Bi-directional Loop
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs

E&M Voice Tributary Card

ERM-Mux/Plus-E&M



The ERM-Mux/plus E&M Voice Tributary Card provides six independent Ear & Mouth Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) to facilitate voice to voice connections. The channels support selection of Type 1~5, support 2 or 4 wire operation and have 0.5dB steps for signal attenuation. When using this card, an appropriate voice compatible power module must be used in the ERM-MUX/Plus.

Features

- Six independent channels
- 2/4 wire independent setting
- 1x64 setting from any E1 channel
- E&M Signaling PBX trunks
- Provides E line, M line, SB (battery) and SG (ground) lines
- Supports types I, II, III, IV or V
- G.711 Codec
- LED indicators for Power, Alarm, activity
- Hot Swappable

Specifications

Loop current	: 5~30 mA, maximum 70 mA.
Return loss	: 300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Group delay	: @-10dBm0 <750uSec(2W) <600uSec(4W)
Total Distortion	: according to ITU-T G.223
Channel crosstalk	: < -65dB, 1020Hz@0dBm0
Noise	: < -65dBm0p weighted
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs



FXO Voice Tributary Card

ERM-Mux/Plus-FXO

The ERM-Mux/plus FXO Voice Tributary Card provides six independent Foreign Exchange Office Voice channel capability. Each channel can independently assign any 64Kbps timeslot from the aggregate E1. Individual Shielded RJ-45 connectors provide the voice connections. Standard UTP or alternately shielded UTP are both acceptable cabling media. These voice channels may be linked to PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network) to facilitate voice to voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.

Features

- Six independent channels
- 2 wire
- G.711 Codec
- 1x64 setting from any E1 channel
- PCM30 R2 Signaling PSTN trunks
- Links PBX to PBX or extends POTS
- LED indicators for Power, Alarm, activity
- Hot Swappable

Specifications

On-hook DC resistance	: > 100K Ohms
Ring AC resistance	: > 7.5K Ohms
Ring power sensitivity	: < 50mW
Off-hook DC resistance	: < 300 Ohms
Max. Input Voltage	: 70VDC
Max. Input Current	: 150mA
Return loss	: 300-600Hz >12dB (2W) 600-3400Hz >15dB (2W) 300-3400Hz >20dB (4W)
Channel crosstalk	: < -65dB, 1020Hz@0dBm0
Noise	: < -65dBm0p weighted
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs



FXS Voice Tributary Card

ERM-Mux/Plus-FXS

The ERM-Mux/plus FXS Voice Tributary Card provides six independent Foreign Exchange Station Voice channel capability. These 6 channel tributary cards are designed for voice applications over E1. Typically, an FXS connects to a standard telephone set. The FXS needs to sense on-hook, off-hook or disconnected status. It also must be able to provide ring function to a telephone set and it must pass caller-ID information. In the ERM-Mux/plus point-to-point application, the FXS can connect to a remote FXO (Foreign Exchange Office) when deployed as an extension from PBX (Private Branch Exchange) or PSTN (Public Switched Telephone Network). It may also connect to a remote FXS, also for extension from PBX or as a direct 'hotline' voice connection. Individual Shielded RJ-45 connectors provide the voice connections. When using this card, an appropriate voice compatible power module must be used in the ERM-Mux/plus.

Features

- Six independent channels
- 2 wire
- G.711 Codec
- 1x64 setting from any E1 channel
- Provides ring function
- Supports caller-ID forwarding
- PSTN extension or direct "Hot-line"
- Links PBX to PBX or extends POTS
- LED indicators for Power, Alarm, activity
- Hot Swappable

Specifications

Effective ring voltage	: AC 75VRMS +/-15V@25Hz +/-3Hz, <10% THD
	Ring voltage at 300mA load : >50VACRMS
Loop resistance	: <1.8K Ohms, including 300 Ohms for telephone
On-hook current	: 10mA +/-3mA.
Off-hook loop current	: 18-50mA.
Surge protection	: 1000V, 10uSec transient response, decay to 50% in 700uSec 300VRMS for less than 200mSec; no component damage 220VRMS for 15 minutes; damage only local loop
Channel crosstalk	: < -65dB, 1020Hz@0dBm0
Noise	: < -65dBm0p weighted
Temperature	: 0°C ~ 50°C
Humidity	: 5~95%
MTFB	: 65,000 hrs

1U, 3 I/O Slot Data, Ethernet, Voice E1 Managed Multiplexer

ETU02-MUX-Plus



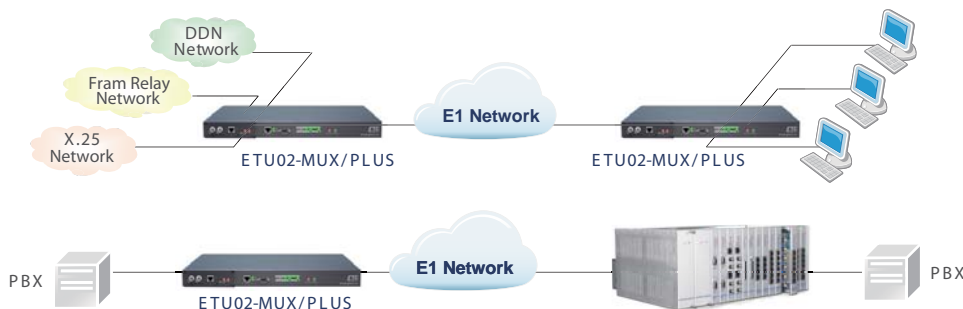
The ETU02-MUX/PLUS is a 1U 19(23)" 3 slot rack type E1 Time Division Multiplexer for Fractional E1 network access which provides an economic solution for central site or remote installations. There are 3 slots available for hot-swappable ETU02-MUX/PLUS I/O cards. One slot is provided for MUX-E1 card, which provides either single E1 main link or main E1 link plus a drop and insert sub-E1 port. The MUX-E1 card may be linked to another ETU02-MUX/PLUS or ERM-MUX/PLUS Rack to provide a point-to-point variety of datacom, Ethernet & voice over E1 network services. The ETU02-MUX/PLUS optionally accommodates up to two separate power supplies, which may derive power from AC (110/220) or DC (-48V) power sources. When two power supplies are installed, the modules provide complete power redundancy and are hot swappable even during the E1 cards' transmission. The ETU02-MUX/PLUS provides BNC and RJ-45 for E1 Line interface connections, RJ-45 connections are used for all voice (FXO, FXS, E&M), for 10/100 Ethernet Bridge and G.703/64K Co-directional. Optional cable adapters are used to convert the DB-62F DCE ports of the I/O cards to 4xRS-232 or HP68F DCE ports of I/O card to 2x V.35, RS-530, RS-449, RS-422 and X.21 channels.

Features

- 1U 19" 3-slot chassis
- Provides 3 slots, removable interfaces: V35, X21, RS530, RS449, RS232, G.703 Co-directional, Ethernet Bridge, FXO, FXS and E&M
- Optional drop and insert E1 port (Sub E1)
- Setup and Control via RS-232 terminal
- Multiple clock source selection (Internal or External: E1 recovery, DTE or DCE)
- Optional SNMP management

Specifications

Indications	Power, Signal loss, Sync loss, Alarm (AIS, MRAI, RAI), TD, RD, Error, Test
Standard	ITU-T G.703/G.704/G.706 & G.732, G823
Power / Consumption	AC: 90 ~ 250V / 20W
Dimensions / Weight	235 x 438 x 45mm (D x W x H) / 2.9kg
Temperature	0 ~ 50°C (Operating), -10 ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
MTBF	57,000 hrs



FXO

- Provides 4 independent channels
- Connects directly to PSTN



Specifications

- Connector RJ-45*4
- Impedance 600 ohms
- Level Gain On Tx side 0 dB On Rx side -3.5dB
- Ring current impedance > 7.5k ohms
- Direct current resistance < 300 ohms
- Maximum direct current borne > 70V

8E1-DXC

- 8 independent channels



Specifications

- Connectors BNC for unbalanced ; RJ-45 for balanced
- Framing Format Unframed / Framed CCS(PCM31) / CAS (PCM30)
- CRC check CRC4 on/off
- Bit rate 2.048Mbps±0 ppm
- Line code AMI / HDB3
- Line impedance 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)



Ordering Information

Model Name	Type	Description
ETU02-MUX/PLUS/AC	Chassis	1U 19" 3+1 slot Chassis with SNMP card and AC Power
ETU02-MUX/PLUS/DC48	Chassis	1U 19" 3+1 slot Chassis with SNMP card and DC 48V Power
ETU02-MUX/PLUS/DC24	Chassis	1U 19" 3+1 slot Chassis with SNMP card DC 24V Power
ETU/E1SUB	Card	E1 Trunk Module with One Main E1 and One Sub E1 Lines in BNC Type Both
ETU/E1	Card	E1 Trunk Module with One Main E1 Line in BNC Type
ETU/N64	Card	2Ch V.35/X.21/RS-449 Module, N X 64Kbps
ETU/232	Card	4Ch RS-232 Modul
ETU/232-C	Card	4Ch RS-232 Module with Clock
ETU/ET100	Card	2Ch 10/100Base-T EthernetModule RJ-45
ETU/FXS	Card	4Ch FXS Interface Module RJ-45
ETU/FXO	Card	4Ch FXO Interface Module R-J45
ETU/E&M	Card	4Ch E&M Interface Module R-J45
ETU/G64	Card	2Ch G.703 64Kbps Co-directional Module RJ-45
ETU/8E1-DXC	Card	8ch E1-DXC Card

ETU02 – MUX / PLUS / ☐ ☐

Example: ETU02 – MUX / PLUS / AC

G.703/64K co-directional card

- 2-channels, Co-directional 64K interface

Specifications

- Interface types** G.703/64K, Co-directional
- Connector** RJ45 x 2
- Line code** ITU-T G.703/64K, Co-directional
- Data rate** 64kbps±100ppm x 2 channels
- Line impedance** 120 ohms (balanced)
- Frame mode** Unframed only



FXS

- Provides 4 independent channels
- Connects to standard telephones

Specifications

- Connector** RJ45 x 4
- Impedance** 600 ohms
- Level Gain** On Tx side 0 dB; On Rx side -3.5dB
- Ring current Output** 75±15V
- Frequency** 25±3Hz
- Feeding voltage** -48
- Loop resistance** 1800 ohms
- Connecting distance** up to 4km
- Wire Gauge** 0.4mm
- Feeding working current** 20mA



RS-232 card

- 4-channels
- Data rate: Asynchronous mode ≤ 38.4Kbps (4-channels),
- Synchronous mode = 19.2/38.4/64/128Kbps

Specifications

- Interface type** RS-232
- Connector** HD62F (female) with cable adapter
- Line code** NRZ
- Data rate** 3.84kbps x 4ch or 64/128kbps x 4ch



E&M

- BD/GD wires are for battery and ground detection
- E&M card provides 4 independent channels
- E&M interface provides 1 pair of E and 1 pair of M
- Each E&M can support Type I, II, III, IV or V
- Loop current range is normally 5-30mA, 70mA max
- Timeslot 16 complies with ITU-T G.711
- TX / RX attenuation, and 2 / 4 wire operation

Specifications

- Input level** 0 to -16dB, in 0.5dB steps
- Output level** 0 to -16dB, in 0.5dB steps
- Impedance** 600 ohms, option
- Return loss** 2-wire 300-600Hz: >12dB
2-wire 600-3400Hz: >15dB
4-wire 300-3400Hz: >20dB
- Group delay** 2-wire @ -10dBm: < 750μ second
4-wire @ -10dBm: < 600μ second
- Total distortion** According to ITU-T G223
- Channel cross-talk** Not exceed -65dB, 1020Hz@0dBm
- Out-of-band Signal attenuation** -25dBm@4.6~72KHz
- Level not to exceed** -50dBm
- Noise** <-65dBm
- Interface connector** RJ-45*4



E1 and Sub E1 module

- Single E1 or 1+1 E1 card (E1 and Sub-E1), provides unbalanced BNC or balanced RJ45 connector
- Each E1 loop provides clock to be used as system clock source

Specifications

- Connectors** BNC for unbalanced ; RJ-45 for balanced
- Framing Format** Unframed / Framed CCS (PCM31) / CAS (PCM30)
- CRC check** CRC4 on/off
- Bit rate** 2.048Mbps±0 ppm
- Line code** AMI / HDB3
- Line impedance** 75 ohm(BNC) / 120 ohm(DB-15, RJ-45)
- Relative receive level** 0 to -43dB
- Transmitter driver reach** 1.5Km
- Pulse amplitude** Nominal 2.37V ±10% for 75ohm
Nominal 3.00V ±10% for 120ohm
- Zero amplitude** ±0.1V
- Transmit frequency** Internal timing ±30 ppm
- Tracking** Recovery timing ±50 ppm
- External** timing±100 ppm
- Jitter performance** According to ITU-T G.823
- Compliance** ITU G.703, G.704, G.706, G.732



Nx64 card

- 2-channels , High speed data interface
- Data rate: N*64kbps, where N=1 to 31 in CCS N=1 to 30 in CAS

Specifications

- Interface types** RS-530, X.21, V.35, RS-449, RS-232
- Connector** HD68F (female) with cable adapter
- Line code** NRZ
- Data rate** Nx64kbps



ET-100 Ethernet Bridge card

- 2 independent channels, Ethernet bridge interface
- 10/100Base-TX bridge
- Auto-Negotiation, Auto MDI/MDIX
- Forward 1522 bytes (Max.) packets
- Supports IEEE 802.1q Tag VLAN pass thru
- Support flow control (Pause)

Specifications

LAN Specifications

- Standard** Fully compliant with IEEE 802.3/802.3u
- Connector** RJ-45x2, 10/100Base-TX, Auto-negotiation
- Speed** 10Base-T/100Base-TX, Full or half duplex
- Frames** Supports 64 to 1522 byte packet lengths standard and extended length frames for VLAN tagging, etc.

WAN Specifications

- Protocol** Synchronous HDLC
- Rates** N*64 or N*56Kbps, up to 2048Kbps



G.703 64Kbps Co-Directional to V.35 / RS-530 / 449 / 232 / X.21

G703 / 64A-STD



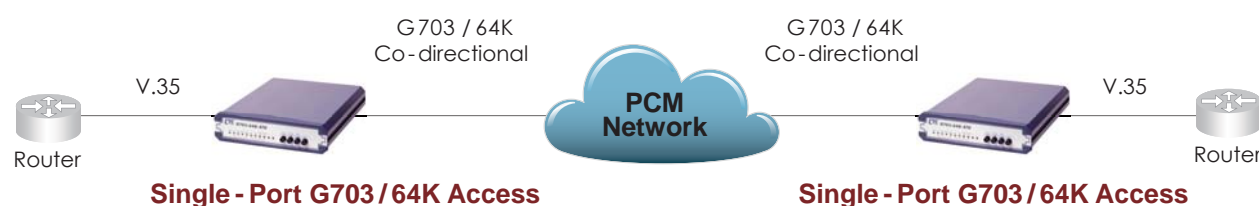
The G703/64A-STD is a 1U half 19" stand-alone or rack mountable interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode, appropriate interface settings and adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels.

Features

- 1U half-19" single port G703 64kbps access unit
- Interface: V.35, X.21, RS530, RS449 and RS232 with cable
- Data rate: 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Data port provides 10bit FIFO
- Diagnostics: local and remote analog and local digital loopback

Specifications

Interface	Types: co-directional, centra-directional, or contra-directional 64Kbps Frame format: Unframed Line: 4 wires, 0.5 ~0.7mm twisted pair cable Range: up to 800 meters over 24AWG Impedance: 120 ohm Pulse amplitude: Nominal 1.0V ±10 Zero amplitude: ±0.1V Clock frequency: 64KHz Frequency tracking: ±100ppm Connector: DB9F
Data interface	Types: V.35, X.21, RS-530, RS-449, RS-232 with adapter cable Data rate: 64kbps for Sync. 19.2kbps for Async Connector DB25F
Indications	LEDs (Power, TD, RD, RTS, DCD, TX, RX, Signal, Timing, Err, Test)
Standards	ITU-T G.703, G.823
Power Input	AC: 90 ~ 250 VAC DC24: -18 ~ -36 VDC, DC48: -36 ~ -72 VDC
Power Consumption	10W
Dimensions	235 x 195 x 45mm (D x W x H)
Weight	1.6kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs



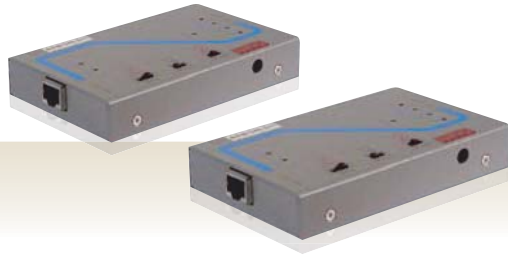
Ordering Information

Model Name Description

G703/64A-STD/AC	Access Units with AC power supply (90 ~ 250 VAC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232
G703/64A-STD/DC	Access Units with -48 VDC power supply (±36 ~ ±75 VDC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232
G703/64A-STD/DC+24	Access Units with +24 VDC power supply (±18 ~ ±36 VDC) Support interface: V.35 / RS-530 / RS-449 / X.21 / RS-232

G703/64A – STD / ☐ ☐

Example: G703/64A – STD / AC



G.703 64Kbps Co-Directional Compact Standalone Unit

G703 / 64A

The G703/64A is a compact stand-alone interface converter that allows full conversion between G.703 64Kbps co-directional services and a number of data port interfaces including ITU V.35, X.21, EIA RS-530, RS-449 and RS-232 hardware. The interface converters are very easy to implement. Simply select the mode and appropriate interface settings by DIP switch, select an adapter cable, configure the required timing for translation via internal DIP switches, and connect to appropriate power. This model features full compliance with all the relevant ITU & EIA standards under 64Kbps network environments with high reliability. G.703 64K Family of products may be used in Packet Switching Networks, ISDN and DDN. They are also useful for data terminals which access PCM, 64K/2048Kbps digital channels as well as digital microwave channels. Additionally, it may be connected to satellite communication channels

Features

- Palm size single port G703 64kbps access unit
- Interface: V35, X21, RS530, RS449 and RS232 with cable adapters.
- Data rate : 64Kbps Sync and Async RS232 up to 19.2Kbps
- Fully transparent signal conversion
- Selectable timing modes: recovery, transparent, data port or internal OSC
- Selectable co-directional, centra-directional or contra-directional
- Diagnostics: local analog and digital loopback

Specifications

Interface	G.703/64K interface Types: Co-directional, Centra-directional, or Contra-directional 64Kbps Frame format: Unframed Line: 4 wires, 0.5 ~0.7mm twisted pair cable Range: up to 800 meters over 24AWG Impedance: 120 ohm Pulse amplitude: Nominal 1.0V ±10 Zero amplitude: ±0.1V Clock frequency: 64KHz Frequency tracking: ±100ppm Connector: RJ-45
Data interface	Types: V.35, X.21, RS-530, RS-449, RS-232 with adapter cable Data rate: 64kbps for Sync. 19.2kbps for Async Connector DB25F
Indications	LEDs (Power, RD, SD, GRD, GSD, Signal loss, Timing loss)
Standard	ITU-T G.703, G.823
Power Input	9VDC
Power Consumption	5W
Dimensions	135 x 79 x 30mm (D x W x H)
Weight	0.18kg
Temperature	0°C ~ 50°C (Operating), -10°C ~ 70°C (Storage)
Humidity	10 ~ 90% non-condensing
Certification	CE, FCC
MTBF	57,000 hrs

4 G.703 64Kbps Co-Directional



Ordering Information

Model Name Description

G703/64A-232	G.703 64kbps Converter with single RS-232 interface with adapter cable
G703/64A	G.703 64k Converter with DB25 interface Optional Cables solution for V.35 / RS-530 / RS-449 / X.21

G703/64A – ☐☐☐

Example: G703/64A – 232